J Youth Adolescence (2009) 38:1214–1225
DOI 10.1007/s10964-008-9332-5

EMPIRICAL RESEARCH

Posttraumatic Stress as a Mediator of the Relationship Between Trauma and Mental Health Problems Among Juvenile Delinquents

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Received: 17 June 2008 / Accepted: 12 August 2008 / Published online: 9 September 2008

Abstract This study investigated the interrelationships among trauma exposure, PTSD, and mental health problems in a sample of 289 adolescents (199 male, 90 female) detained in a juvenile correctional facility. Mean differences were found in that females scored higher than males on measures of interpersonal trauma exposure and symptoms of both simple and complex PTSD. Females also endorsed more mental health problems in the areas of depression/anxiety, somatic complaints, and suicidal ideation. For all youth, trauma exposure, PTSD, and mental health problems were correlated. Results of structural equation modeling were consistent with the hypothesis that PTSD mediates the relationship between interpersonal trauma and mental health problems for all youth, although the results were stronger for females.

Keywords Trauma · Delinquency · Posttraumatic stress · Gender

Within the research on adolescent development, a relatively neglected subgroup is comprised of youth detained in juvenile correctional facilities. Youth who commit offenses serious enough to warrant detention represent an extremely high risk sample and yet one which may be overlooked in many studies of the development of antisocial behavior. For example, whereas many researchers gather their data in schools, detained youth will be excluded from these samples as will those severely delinquent adolescents who are habitually truant or school drop-outs (Kerig and Wenar 2006). However, despite their ability to elude researchers, detained youth are important to study. Evidence is emerging that youth in the juvenile justice system differ from their "garden variety" conduct disordered peers in a number of respects. Youth in detention exhibit the most severe and pervasive maladaptation and are at risk for the most negative developmental outcomes (Atkins et al. 1999; DiFilippo et al. 2003; Todis et al. 2001). Of particular concern is the fact that a significant number of youth enter the juvenile justice system with serious mental health problems (Grisso et al. 2005; Teplin et al. 2006). For example, Teplin et al. (2002) found that, among a sample of detained delinquents, 27% of boys and 84% of girls met criteria for a DSM-IV diagnosis of mental disorder. In fact, one study determined that youth in detention were indistinguishable from those in residential psychiatric treatment in regard to the severity of their psychological symptoms (Cohen et al. 1990). It is estimated that each year at least 15,000 youth are detained in the US not because they are dangerous to society, but because they suffer from acute mental health disorders (Grisso et al. 2005).

One specific mental health issue among juvenile delinquents that is receiving increasing attention is posttraumatic stress disorder (PTSD; Ford 2002; Wood et al. 2002b). The prevalence of PTSD among delinquent youth is up to 8 times higher than in community samples (Wolpaw and Ford 2004). Rates of PTSD are even more marked in samples of female delinquents, for whom the prevalence is as high as 70% (Arnzen Moeddel and Kerig 2008; Cauffman et al. 1998; Timmons-Mitchell et al. 1997). Left untreated, posttraumatic stress disorder is associated with significantly negative developmental outcomes in adolescence, including a wide variety of mental health problems such as depression, substance abuse, anxiety, suicide attempts, and aggression; as well as adolescent pregnancy, physical health problems,

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and relationship difficulties (Anda et al. 2006; Veysey 2008; Wolfe et al. 2006). Summarizing this research, Nader (2008) states: "Following traumatic experiences, a significant number of children react in ways that substantially disrupt or impair their and their family's lives, their growth and development, and their abilities to function normally" and thus, unresolved trauma "may seriously derail a youth's life path; task, work, or academic performance; and well-being" (p. 3).

Research suggests that posttraumatic stress disorder among juvenile delinquents arises from the experiences of maltreatment and violence, which are all-too common in their lives. Over 90% of delinquent youth have experienced a traumatically stressful life event and the typical delinquent has experienced an average of 14 distinct traumas in his or her lifetime (Abram et al. 2004). Further, youth who are detained are overwhelmingly more likely than their community peers to have witnessed or been victimized by violence in their homes and communities (Abram et al. 2004; Wood et al. 2002a). Most frequently, the trauma is in the form of physical or sexual abuse at the hands of a caregiver (Famularo et al. 1990; Johnson et al. 2006). Evidence also suggests that, in comparison to their male peers, female delinquents are disproportionately likely to have experienced trauma (Cauffman et al. 1998; McCabe et al. 2002; Lederman et al. 2004; Wood et al. 2002b). In addition, females are particularly likely to have experienced interpersonal forms of trauma such as being physically and sexually abused by a family member or being the direct target of violence in the community (Cauffman et al. 1998; Chamberlain and Moore 2002; Herrera and McCloskey 2003; McCabe et al. 2002; Steiner et al. 1997; Wood et al. 2002a). Some research suggests that females may be more likely than males to develop PTSD symptoms as a result of exposure to trauma (Giaconia et al. 1995; Horowitz et al. 1995) and girls may be especially reactive to childhood abuse and family violence (Jaycox and Repetti 1993; Lewis et al. 1991). Therefore, repeated exposure to direct, interpersonal traumas places female delinquents at particular risk for the development of PTSD (Wood et al. 2002b).

In recognition of the prevalence of interpersonal violence in the lives of troubled youth, new theories of the developmental psychopathology of juvenile delinquency have been proposed that conceptualize trauma as a pathway to psychological disturbance in adjudicated adolescents. According to Ford et al. (2006), trauma triggers a state of physiological and psychological alarm in which mediation of thought, emotion, and behavior by the executive functions of the brain is overwhelmed by distress and terror. If the trauma persists unabated over time, this heightened state of alarm exhausts the mind's and body's resources and the youth is left with a depleted ability to regulate affect, a rigid cognitive style, and a limited repertoire of coping strategies. Moreover, repeated victimization has the capacity to interfere with important developmental attainments of adolescence, including self-respect, self regulation, and interpersonal trust. Experientially, Ford et al. (2006) describe traumatic victimization as involving a loss of personal integrity and control that is a profound assault to the development of the self. In an attempt to redress the injustice of their maltreatment and regain a sense of control, youth may engage in "survival coping" in which they outwardly express defiance and callousness toward others while masking inner hopelessness, shame, and despair. If the environment does not respond to this muffled cry for help, defiance gives way to desperation and a perceived justification to take any means necessary to avoid revictimization, termed "victim coping." As development proceeds, the maltreated youth displays an increasing loss of empathy toward others, distorted interpersonal cognitions, lack of impulse control and self regulatory capacity, and diminished sense of future. In this way, unaddressed trauma leads to escalating psychological, behavioral, and relational problems across the course of adolescence in Ford et al.'s model. In turn, Lansford et al. (2006) propose that the links among trauma, delinquency, and psychopathology are a function of the use of emotional numbing as a "pathological adaptation" (p. 51) strategy which protects the youth from the conscious awareness of distress but increases the likelihood of acting it out in maladaptive ways. Although promising, these models have not been directly tested and, therefore, advancement in the field requires the further investigation of the interrelationships among trauma exposure, PTSD, and mental health problems in juvenile delinquents.

In addition, whereas important strides have been made in identifying the association between trauma and juvenile delinquency, another major limitation is that this work to date has focused on the assessment of trauma exposure and PTSD as they are defined by the DSM-IV (American Psychiatric Association 2000). Originally developed to capture the experiences of combat veterans, the DSM-IV criteria focus on discrete, dramatic, single-incident stressors (such as car accidents or natural disasters) that result in what has been termed type I (Terr 1991) or simple PTSD (Herman 1992). Simple PTSD is evidenced by symptoms of reexperiencing (e.g., intrusive thoughts, flashbacks, and heightened reactivity to reminders of the trauma), avoidance (e.g., attempts to avoid people and places associated with the trauma, detachment, and withdrawal), and increased arousal (e.g., sleep and concentration problems, hypervigilance, and exaggerated startle response). However, youth who are exposed to prolonged, repeated, interpersonal stressors such as child abuse present a different symptom picture, termed type II (Terr 1991), complex PTSD (Herman 1992; Courtois

2004) or, more recently, developmental trauma disorder (van der Kolk 2005). In contrast to the short, sharp, shock to the system associated with a type I trauma, type II traumas such as child abuse are repeated over the course of childhood and often are perpetrated by the very caregivers whom children rely on for protection. Therefore, type II traumas have the capacity to disrupt the development of affective, cognitive, and interpersonal capacities in adolescence. Exposure to such prolonged, pervasive, and insidious trauma results in a set of complex PTSD symptoms, including affect dysregulation, guilt, impaired relationships, and dissociation, which are listed in DSM-IV (2000) as associated features of chronic trauma. Given the extent to which adjudicated youth have experienced the kinds of repeated interpersonal traumas that are associated with such symptoms, it is important for studies of juvenile delinquents to include measures that are sensitive to the presence of complex PTSD symptoms.

Although research has documented age-related differences in the way that PTSD is expressed during childhood and adolescence, consensus in the field is that the DSM-IV diagnosis is a valid one for youth (Fletcher 2003; Pynoos et al. 1998; Steinberg et al. 2004). Developmental differences include that, in comparison to adults, adolescents evidence a greater tendency toward withdrawal and feelings of estrangement from others which may be evidenced by school avoidance, irritability, or hypersomnia; and adolescents also more often report a sense of futurelessness (Kerig et al. 2000). Youth also tend to exhibit a wider range of associated symptoms than do adults (Nader 2008), again pointing to the need for measures that include features of complex PTSD. In addition, youth frequently do not meet criteria for a full diagnosis of PTSD and yet have symptoms severe enough to significantly interfere with functioning (Newman 2002). Thus, as is the case with investigations of other forms of child psychopathology (Achenbach 2000) research on adolescent PTSD is best served by data that focus on continuous ratings of PTSD symptomatology rather than on diagnostic status alone.

Hypotheses

To summarize, the present study focused on a relatively neglected subgroup of adolescents, youth in juvenile detention. Previous research has shown that these youth display significant rates of trauma exposure and are at high risk for serious mental health problems. Although the research on delinquency to date has established links between trauma and PTSD, trauma and mental health problems, and PTSD and mental health problems, the purpose of the present study was to fill a gap in the existing literature by investigating the dynamic relationship among these three variables. Based on recent theories regarding the developmental psychopathology of delinquency, we hypothesized that exposure to interpersonal trauma would predict mental health problems among juvenile delinquents, and that symptoms of complex and simple PTSD would mediate the relationship between trauma exposure and psychological disturbance. Because previous research also has indicated a differential prevalence of and sensitivity to trauma among delinquent girls, we also hypothesized that gender would act as a moderator of the relationships among trauma, PTSD, and mental health problems in this sample.

Method

Participants

Participants included 289 youth newly remanded to the custody of a county juvenile detention center in the Midwest from January to July, 2007. Among the 199 males and 90 females included, 69% were of European American descent, 22% African American, 4% Latino, 4% multiracial, and 2% American Indian/Pacific Islander. Youth ranged in age from 10 years, 7 months to 17 years, 11 months. Committed offenses ranged widely, from status offenses to assault.

Measures

Trauma Exposure

The *UCLA Posttraumatic Stress Disorder Index for DSM-IV Adolescent Version* (PTSD-I; Pynoos et al. 1998; Steinberg et al. 2004) is a well-validated measure used to screen for exposure to traumatic events and symptoms of PTSD in youth. The first set of questions asks youth whether or not they have been exposed to 13 specific traumatic events. The number of events endorsed is summed to create a Total Trauma Exposure score, and a Total Interpersonal Trauma index is calculated separately for those traumas involving direct victimization by other persons. The PTSD-I was administered in an interview format by a trained clinician within 48 h of the youth's admission to the detention center.

Simple PTSD Symptoms

The next set of questions on the PTSD-I inquire as to which of the events endorsed the youth considers to be most distressing, and whether in relation to that event the youth experienced subjective reactions consistent with DSM-IV Criterion A. This criterion requires that the event be appraised by the individual as involving "actual or threatened death or serious injury, or a threat to the physical

integrity of self or others" and be associated with reactions of "intense fear, helplessness, or horror" or, in children, "disorganized or agitated behavior" (American Psychiatric Association 2000, p. 467). Only events that satisfy both of these conditions meet the DSM-IV definition of trauma. If Criterion A is met, the remaining questions on the PTSD-I ask youth to identify the most distressing event they have experienced and then to rate in reference to this event the extent to which they have experienced in the past month any of the symptoms associated with Criterion B (reexperiencing), Criterion C (avoidance), and Criterion D (increased arousal). A Total PTSD score is calculated as a sum of all Criterion B, C, and D symptoms endorsed. Responses to the questions are presented in a Likert scale format ranging from 0 = none of the time to 4 = most of the time. Additionally, the instrument provides preliminary diagnostic information as to whether a Full or Partial diagnosis of PTSD is likely (Rodriguez et al. 1999). For a Full diagnosis, Criteria A, B, C, and D must all be met. For a Partial diagnosis, Criterion A must be met as well as one of the following combinations of criteria: Criteria B and C, Criteria B and D, or Criteria C and D. The PTSD-I has demonstrated good convergent validity in comparison with other structured diagnostic interviews, and internal consistencies of the scales are high, as is test–retest reliability over a period of 7 days (Steinberg et al. 2004). For the current study, Cronbach's alpha for Criterion B = .84, for Criterion C = .78, for Criterion D = .69, and for the Total PTSD score = .89.

Complex PTSD Symptoms

A Complex PTSD Index was created including two supplementary questions not otherwise scored on the PTSD-I and five questions drawn from the Clinician Administered PTSD Scale for Children and Adolescents (CAPS-CA; Nader et al. 1998) which inquire about the frequency with which the youth experiences associated features such as guilt, dissociation, and impaired relationships with others. Each item is rated on a scale ranging from 0 = none of the time to 4 = most of the time. In the current sample, Cronbach's alpha for the Complex PTSD Index was .73.

Mental Health Problems

The *Massachusetts Youth Screening Instrument—Second Version* (MAYSI-2) is the most widely-used and psychometrically sound measure used to screen for mental health problems in juvenile detention settings (Grisso and Quinlan 2003). The MAYSI-2 includes five validated and reliable scales comprised of Alcohol/Drug Use (e.g. "Have you gotten in trouble you when you've been high or have been drinking?"), Anger-Irritability (e.g. "When you have been mad, have you stayed mad for a long time?"), Depressed-Anxious (e.g. "Have nervous or worried feelings kept you from doing things you want to do?"), Somatic Complaints (e.g., "When you have felt nervous or anxious, has your stomach been upset?"), and Suicidal Ideation (e.g., "Have you felt like life was not worth living?"). A sixth scale, Thought Disturbance, has emerged as valid for males only and therefore was not used in the present analyses. Each MAYSI-2 scale contains 5–9 items requiring a "yes" or "no" response. "Yes" responses are tallied to create an independent score for each scale. The MAYSI-2 scales were determined via factor analysis and validity was assessed through correlations with similar scales on well-established measures (Grisso and Barnum 2003). Alpha coefficients for the scales range from .61 to .86, with an average of .75.

Procedure

This study and all procedures used were approved by the Butler County Juvenile Justice Center and the Miami University Human Subjects IRB. De-identified archival data were made available for the present analyses. The measures were administered as part of the routine mental health assessment conducted by the detention setting to every youth newly admitted to the facility. The MAYSI-2 was administered within 24 h after each youth's admission to the detention center via Voice Format whereby questions were simultaneously presented on a laptop computer screen and spoken aloud over wireless headphones. A trained detention staff person sat in another part of the room during the administration of the MAYSI-2 to insure privacy but to be available to answer questions and follow up on critical items if appropriate. The PTSD-I was administered in an interview format by a trained clinician within 48 h of the youth's admission to the detention center. Whereas the MAYSI-2 was administered to 100% youth in the facility, 10 resident males and 7 females declined to complete the PTSD-I and therefore these youth are not represented in the current sample. There were no differences between the participants who did and did not complete the PTSD-I on any of the demographic variables nor on the MAYSI-2 scores.

Results

Traumatic Experiences

Table 1 displays the proportion of youth who identified as their most distressing experience each of the 13 traumatic events inquired about during the PTSD-I interview. The average length of time elapsed since the traumatic event was 33 months (SD = 35.92). The most recently reported traumatic event occurred 1 month prior to the youth's entry

Table 1 Most traumatic experience reported by youth on the PTSD-I scale

	Males		Females	
	Frequency	Percent (%)	Frequency	Percent (%)
Earthquake	0	0	0	0
Other disaster (fire, tornado, flood)	7	4.2	0	0
Accident	13	7.8	4	5.1
War	1	.6	0	0
Experienced domestic violence	13	7.8	16	20.3
Witnessed domestic violence	20	12.0	6	7.6
Experienced community violence	36	21.7	4	5.1
Witnessed community violence	18	10.8	6	7.6
Saw a dead body	6	3.6	3	3.8
Sexual abuse	3	1.8	19	24.1
Injury/death of loved one	36	21.7	11	13.9
Medical trauma	7	4.2	2	2.5
Other	6	3.6	8	10.1

into the detention center and the most long-standing trauma was reported to have occurred 13 years before the interview. The majority of traumas reported related to acts of violence either witnessed or experienced by the youth. Boys were particularly likely to report being victims of community violence whereas domestic violence and sexual abuse were most prevalent among girls.

Gender Differences

T-tests were computed to examine gender differences among the variables measured. As reported in Table 2, results showed that females scored higher than males on measures of interpersonal trauma, simple PTSD, and complex PTSD, as well as the MAYSI scales of Depressed-Anxious, Somatic Complaints, and Suicidal Ideation. Comparison of the proportion of youth who met criteria for a diagnosis of PTSD on the PTSD-I shows that among the females, 45% met criteria for Full PTSD, and 21% met criteria for Partial PTSD. Among the males, 26% met criteria for Full PTSD and 21% met criteria for Partial PTSD.

Correlations

Correlations among the variables are presented in Table 3, reported separately by gender. These correlations were examined in order to establish the conditions necessary for testing meditational relationships (Baron and Kenny 1986).

Table 2 Mean differences by gender

Variable	Females		Males		*t*	*p*	df
	M	SD	*M*	SD			
PTSD-I total	27.52	17.12	20.27	15.09	−3.61***	.000	286
Interpersonal trauma	3.07	2.02	2.47	1.83	−2.47**	.014	287
Non-interpersonal trauma	.79	.87	.67	.83	−1.08	.283	287
Complex PTSD index	10.49	7.71	7.37	6.30	−3.63***	.000	287
Alcohol/Drug Use	2.60	2.69	2.10	2.53	−1.54	.125	287
Angry-irritable	4.97	2.77	3.79	2.74	−3.38**	.001	287
Depressed-anxious	3.50	2.53	2.37	2.31	−3.73***	.000	287
Somatic complaints	3.92	1.89	3.15	1.96	−3.14**	.002	286
Suicidal ideation	1.42	1.83	.83	1.58	−2.79**	.006	287

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

The initial conditions examined were the relationships between the independent variable and the dependent variable, between the independent variable and the potential mediator, and between the mediator and the dependent variable. For females, the independent variable of interpersonal trauma was significantly associated with the mediator of PTSD, whether measured in the form of simple or complex PTSD. Weaker but still significant associations were found between non-interpersonal trauma and simple and complex PTSD. The relationships between the mediating variables of PTSD and the dependent measures of MAYSI scales also were significant, with the exception of Alcohol/Drug Use. Lastly, the relationships between the independent and dependent variables were in the expected directions, with significant associations between the measures of trauma and each of the MAYSI scales. Results for males revealed a similar pattern; however there were fewer significant relationships between non-interpersonal trauma and mental health symptoms for males, specifically on the scales of Anger-Irritability, Depressed-Anxious, Somatic Complaints, and Suicidal Ideation.

Structural Equation Models

Structural equation modeling was performed using Mplus Version 5.1 (Muthén and Muthén 2007) using the maximum likelihood estimation on a correlational matrix. A power analysis was run to examine the plausible models. Using MacCallum et al.'s (1996) framework, close fitting models were hypothesized and found to have sufficient power (>.80). Models were examined with respect to four criteria.

Table 3 Correlations

	Variable	1	2	3	4	5	6	7	8	9
1.	PTSD-I total	–	.68***	.35**	.78***	.24*	.64***	.74***	.54***	.57***
2.	Interpersonal trauma	*.62****	–	.48***	.59***	.34**	.48***	.48***	.42***	.44***
3.	Non-interpersonal trauma	*.32****	*.35****	–	.41***	.28**	.33**	.35**	.22*	.28**
4.	Complex PTSD index	*.82****	*.55****	*.28****	–	.18	.42***	.56***	.36***	.44***
5.	Alcohol/drug use	*.34****	*.40****	*.17**	*.23***	–	.35**	.18	.23*	.26*
6.	Angry-irritable	*.54****	*.29****	*.11*	*.47****	*.40****	–	.63***	.57***	.55***
7.	Depressed-anxious	*.64****	*.36****	*.14*	*.54****	*.34****	*.61****	–	.63***	.60***
8.	Somatic complaints	*.44****	*.18**	*.04*	*.39****	*.22***	*.38****	*.52****	–	.37***
9.	Suicidal ideation	*.38****	*.29****	*.06*	*.29****	*.32****	*.46****	*.62****	*.32****	–

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

Note: Correlations for females are above the diagonal; correlations for males are in italics below the diagonal

The first and most important criterion was theoretical relevance. The models were also evaluated with respect to global fit. Ideally, a model should have a non-significant chi-square (indicating the data did not significantly differ from the hypothesized model), and a Comparative Fit index (CFI; Bentler 1990) and Tucker-Lewis index (TLI; Bentler and Bonnet 1980) greater than .90 (Hu and Bentler 1999). Whereas a non-significant chi-square is ideal, it is difficult to obtain when using larger sample sizes. The third criterion was the micro fit index. Good fit at the micro fit level was indicated by a Root Mean Square Error of Approximation (RMSEA; Browne and Cudeck 1992) less than or equal to .05 (Browne and Cudeck 1992), significant parameter loadings, and low residuals. The final criterion was parsimony. Similar to other statistics, the fewer the number of parameters needed to explain the relationship, the better the fit of the model to the data. No one criterion drove the evaluation of the fit of the models, but rather the abundance of evidence across the criteria and models indicated the best fitting model for the data.

In developing the model hypothesized to best fit the data, we reasoned that interpersonal and non-interpersonal traumas would be only weakly related and thus best treated as independent manifest variables. In contrast, given the co-occurrence of symptoms of simple and complex PTSD in individuals who have experience type II traumas, we expected that symptoms of simple and complex PTSD would form a latent factor and thus allow for a more parsimonious model. Finally, given the high rates of comorbidity of mental health problems among adolescents (Holmbeck et al. 2006), we expected that the MAYSI scales also would form a latent factor.

PTSD as a Mediator

In order to establish mediation, first the hypothesized model was run including only the independent and dependent variables in order to establish a direct relationship ($\chi^2 = (289, 13) = 33.44$, $p = .00$, CFI = .96, TLI = .94, RMSEA = .07). This model then was compared to one in which the mediator was included, with fit statistics showing that the model including all variables was a good fit to the data ($\chi^2 = (289, 23) = 52.14$, $p = .00$, CFI = .97, TLI = .96, RMSEA = .07). Moreover, the significant path linking the dependent variable of mental health problems to the independent variable of interpersonal trauma ($\beta = .48$, $p < .001$) was no longer significant when PTSD symptoms were entered into the equation ($\beta = -.05$, $p > .05$). The nonsignificant path between the dependent variable of mental health problems and the independent variable of noninterpersonal trauma decreased its weight (from $\beta = .05$ to $\beta = -.03$) and continued to be nonsignificant. Taken together, these findings are consistent with a meditational relationship.

Gender as a Moderator

The invariance of the model across gender was examined by restricting the factor loadings to be equal, leaving the residual variances to be free, and constraining the factor means in one group to be zero while leaving them free in the other group. Tests for model invariance indicated that the model that included all participants differed significantly across gender ($\chi^2 = (289, 56) = 78.34$, $p = .03$, CFI = .98, TLI = .97, RMSEA = .05). Therefore, gender acted as a moderator of the relationships among the variables included, indicating that the models for males and females must be considered separately.

The model for females is presented in Fig. 1. The global and micro fit statistics displayed here suggest that for females the hypothesized model was a good fit to the data. According to the parameter loadings, interpersonal trauma was strongly associated with PTSD symptoms, including both simple and complex indices, whereas noninterpersonal

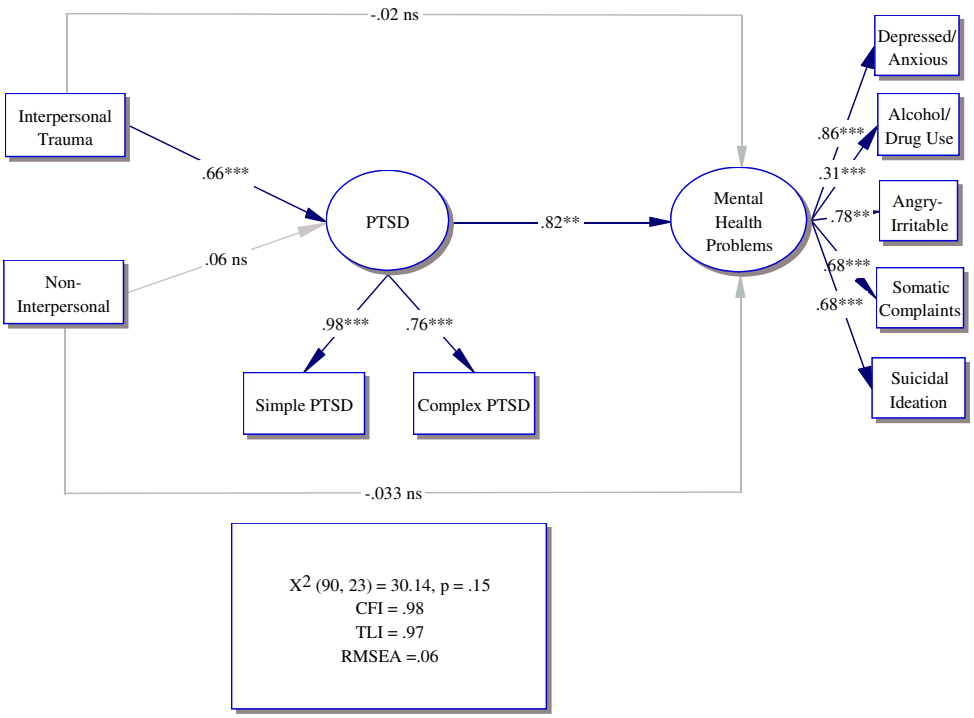

Fig. 1 PTSD as a mediator of the relationship between trauma and mental health problems for females

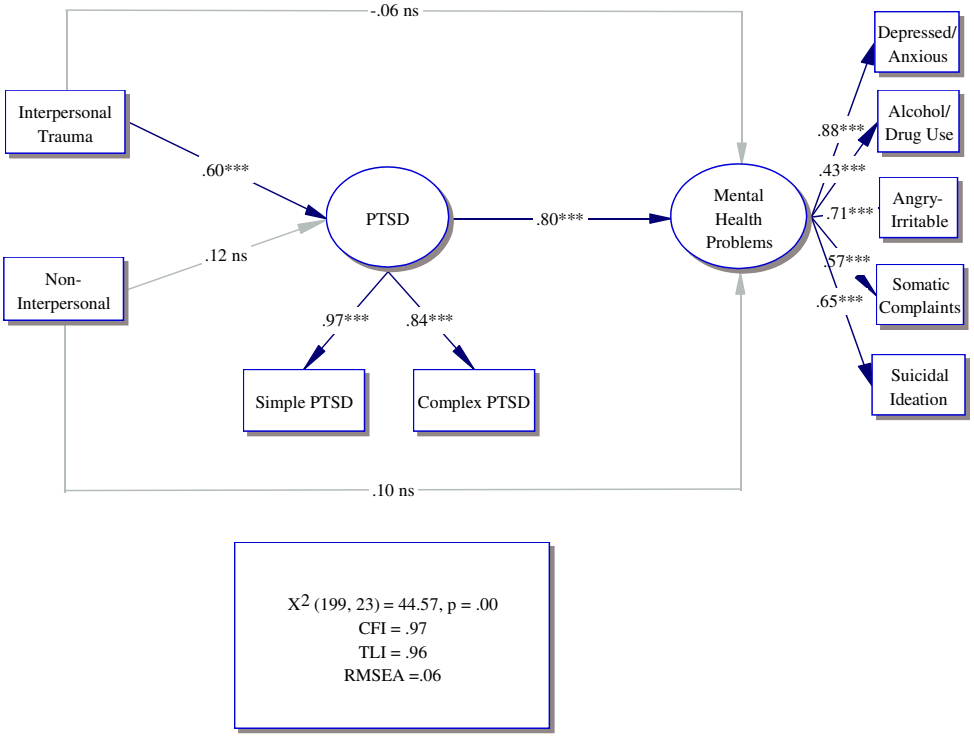

Fig. 2 PTSD as a mediator of the relationship between trauma and mental health problems for males

trauma was not associated with PTSD. When the mediator of PTSD was entered in the equation, the significant path linking the dependent variable to the independent variable of interpersonal trauma ($\beta = .58$, $p < .001$) was no longer significant ($\beta = -.02$, $p > .05$), consistent with a meditational relationship.

The model for males is displayed in Fig. 2. The fit statistics displayed here suggest that the model for males was an adequate fit to the data, although not as well-fitting as the model for females. Whereas the general pattern of results was consistent, the Beta weights for the paths linking interpersonal trauma and PTSD, and PTSD and

mental health problems were weaker in the model for males than the model for females. Nonetheless, just as for females, when interpersonal trauma, PTSD and mental health symptoms were considered in the model for males simultaneously, the significant path linking interpersonal trauma to mental health problems ($\beta = .43$, $p < .001$) was no longer significant ($\beta = -.06$, $p > .05$), indicating a mediational relationship.

Discussion

The results of this study are consistent with new thinking in the developmental psychopathology of juvenile delinquency, which posits that trauma plays a pivotal role in the emergence and persistence of psychological problems among adjudicated youth (Ford et al. 2006; Greenwald 2002). By compromising the development of important psychological functions such as emotion regulation, social information processing, and interpersonal relatedness, trauma may contribute to a constellation of social, behavioral, and emotional problems that are seen among delinquent youth (Dodge et al. 1995; Fergusson and Lynskey 2006; Trickett 2008). Whereas previous studies of delinquents have investigated these relationships piecemeal, such as showing that trauma exposure is related to PTSD (Wood et al. 2002b) and that PTSD is related to psychological symptoms (Cauffman et al. 1998), the present study contributes to this literature by investigating simultaneously the dynamic interrelationships among trauma exposure, PTSD, and mental health problems.

The fact that the structural models tested in the present study better fit the data for girls also is consistent with recent findings that trauma plays a particularly significant role in female juvenile delinquency (Chamberlain and Moore 2002; Hennessy et al. 2004). Despite the prevalence of violence and maltreatment in the lives of all delinquent youth, girls are differentially exposed to such traumatic events (Wood et al. 2002a) and may be more likely than males to develop PTSD as a result of exposure to trauma (Giaconia et al. 1995; Horowitz et al. 1995). Indeed, it has been suggested that trauma is a catalyst for female delinquency, given that girls who are the victims of abuse may act out in ways that lead to their arrest and criminalization by the juvenile justice system (Hoyt and Scherer 1998; Simkin and Katz 2002). Girls who are the victims of repeated abuse at home, for example, may become runaways and resort to criminal activity as a way to survive on the streets (Cauce et al. 2005). The proposition that a significant proportion of female delinquency is related to psychological disturbance is further suggested by studies of the offenses that lead to girls' detention. For example, even though rates of female violence appear to be rising, close reading of the case files of detained girls indicates that the crimes of violence they are accused of actually are trivial and often occur during mutually combative episodes with parents (Chesney-Lind and Belknap 2004); e.g., Acoca (1999) describes as typical the case of a girl who was arrested for "throwing cookies at her mother" (p. 7–8). Instead of aggression, girls' first steps on the pathway toward delinquency are likely to take the form of status offenses—such as substance use, running away, and risky sexual activity—problem behaviors which are predicted by childhood abuse and trauma (Anda et al. 2006; Dube et al. 2006; Ryan and Testa 2005; Widom and Kuhns 1996; Wright et al. 2004). In a sad irony, the angry and rejecting parents who press charges against their daughters for running away from home or acting incorrigible in fact may have contributed to the psychological distress that underlies those behaviors (Lederman and Brown 2000). As Dembo et al. (1995) conclude, "girls' problem behavior commonly relates to an abusive and traumatizing home life, whereas boys' law violating behavior reflects their involvement in a delinquent life style" (p. 21).

The models tested here also support the hypothesis that interpersonal traumas—those associated with direct victimization by others, particularly those with whom the youth has an intimate relationship—are differentially associated with the symptoms of PTSD. These findings may relate to the construct of "betrayal trauma" (Freyd 1997), which posits that it is maltreatment by those whom the child should be able to turn to for trust, nurturance, and care that has the most pernicious effects on psychological development. The findings presented here are consistent with previous research indicating that female delinquents experience the greatest number and extent of interpersonal traumas (Cauffman et al. 1998; McCabe et al. 2002; Wood et al. 2002a). However, these present data further suggest that, when males do experience traumas involving direct victimization, PTSD is more likely to result than when non-interpersonal traumas alone occur.

A number of limitations of this study should be considered. Although the sample drawn was reasonably large and ethnically diverse, it was selective in that it included only those youth who were adjudicated by the juvenile court. As many as half of the youth who enter the detention facility are not adjudicated and, because they remain in detention for only a matter of hours, do not undergo a mental health screening and could not be represented in our sample. The non-adjudicated youth generally are first-time arrestees who have committed a minor offense, such as truancy, thus allowing their quick release. These non-adjudicated youth may differ from those whose offenses are serious enough to warrant detention and may be more similar to the community samples of conduct disordered adolescents that are typically accessed through schools or

outpatient mental health centers. Another limitation to be noted concerns the measure of complex PTSD used, which was created for the present study. Although derived from validated measures, such as the CAPS-CA and PTSD-I, and closely tied to the DSM-IV criteria for associated features of chronic trauma, validity of this complex PTSD index has not been independently corroborated. Further, fully capturing the construct of complex PTSD as elaborated in the proposed DSM-V diagnosis of Developmental Trauma Disorder (van der Kolk 2005) requires assessing a multitude of dysfunctions, including problems in sensorimotor development, affect regulation, dissociation, behavioral control, cognitive distortions, and poor self-concept (Cook et al. 2005); as well as constructs for which youth measures have not yet been developed, such as impaired self-capacities (Briere and Spinazzola 2005).

Additional major limitations of the study include that the measures were all obtained via self-report, and thus subject to mono-informant biases, as well as the fact that these data were collected cross-sectionally. Prospective longitudinal data will be needed in order to definitely test the hypothesis that PTSD increases the likelihood of mental health problems among juvenile delinquents. In this regard, an important direction for future research will be to identify the mediators that account for the relationship between PTSD and delinquency. Promising prospective research on the developmental psychopathology of delinquency to date has tended to focus on the links between trauma exposure and individual mediators, such as social information processing (Dodge et al. 1995) or stigmatization (Feiring et al. 2007). However, the field awaits studies that test multidimensional and interactive models that include the investigation of additional proposed underlying mechanisms such as self regulation, interpersonal cognition, and problem-solving (Ford et al. 2006). Longitudinal studies will also be needed to investigate transactional relationships among trauma, delinquency, and mental health problems. For example, mental health problems such as substance abuse may lead to the youth's arrest and subsequent involvement in the juvenile justice system. Alternatively, delinquency may lead to engagement in risky behaviors, such as involvement in violent gang activities or precocious sexual activity, which in turn expose the youth to trauma.

There are important clinical implications of these data, suggesting that treatment for underlying trauma is essential for the rehabilitation of juvenile delinquents (Ford et al. 2006; Greenwald 2000; Veysey 2008). Unresolved trauma is associated with significant long-term psychological consequences that extend throughout adolescence into adulthood (Wolfe et al. 2006; Wolpaw and Ford 2004). Without intervention, these youth are at high risk for remaining on a pathological trajectory leading to escalating substance abuse, school failure, functional impairment, psychiatric problems, and re-involvement in the criminal justice system (Abram et al. 2004; Leve and Chamberlain 2005; Ryan and Testa 2005). The empirical research to date suggests that cognitive behavioral interventions such as Trauma-Focused CBT (Cohen et al. 2006) hold promise as the treatment of choice for traumatized juvenile offenders (Saunders et al. 2004). In addition, gender-specific programming within juvenile justice centers is needed to reduce the possibility that detention will have re-traumatizing effects through exacerbating anxiety, perceived lack of safety, and loss of control among girls (Hennessy et al. 2004; Hoyt and Scherer 1998).

In conclusion, the results of this study are consistent with new thinking in the developmental psychopathology of juvenile delinquency that suggests that trauma is a pathway by which youth—particularly girls—may become derailed during the process of adolescent development. As Wolfe and Mash (2006) note, the adolescent period represents a key developmental link between childhood experiences and adult outcomes, during which changes in social, emotional, cognitive, and physical development provide opportunities for either intensification or amelioration of previous adaptational difficulties. Even in the context of normative adolescence, youth are vulnerable to experimenting with a number of problem behaviors during the adolescent transition, including substance use, unsafe sexual activities, skipping school, and risk-taking behaviors. These risks are even greater for victimized youth, whose relational skills, social-cognitive coping strategies, and abilities to regulate affect and behavior are negatively affected by the symptoms of posttraumatic stress (Wolfe et al. 2006). Consequently, trauma has the potential to interfere with the major developmental tasks of adolescence, including autonomy from the family of origin, the development of identity, the formation of intimate relationships, and achievement mastery in the contexts of school and work (Holmbeck et al. 2006). Without the socioemotional skills, perceived competence, or support from the environment that would allow them to successfully navigate these stage-salient issues, traumatized youth may resort to maladaptive alternatives that result in their involvement in the juvenile justice system.

Acknowledgements This work was funded by a grant from the Butler County Family and Children First Council. The authors wish to thank Jolynn Hurwitz, Robert Clevenger, Thomas Barnes, the youth who so bravely shared their experiences with us, and the Miami University students who assisted with the project: Julie Swanson, Raven Cuellar, Angela Volz, Emily Kamon, Kristin Briggs, and Carol Humphreys.

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