Transitions into and out of post-traumatic stress among children involved in the child welfare system

Rebeccah L. Sokol[a], **Jason Goldstick**[c,d,e], **Marc A. Zimmerman**[b,c,e], **Maria Muzik**[f,g], **Katherine L. Rosenblum**[f,g], **Alison L. Miller**[b]

[a]School of Social Work, Wayne State University, 5447 Woodward Ave, Detroit, MI 48202, USA

[b]Department of Health Behavior and Health Education, School of Public Health, University of Michigan, 1415 Washington Heights, Ann Arbor, MI 48109-2029, USA

[c]University of Michigan Injury Prevention Center, 2800 Plymouth Road, NCRC 10-G080, Ann Arbor, MI 48109

[d]Department of Emergency Medicine, University of Michigan School of Medicine, 1500 East Medical Center Drive, Ann Arbor, MI 48109

[e]Michigan Youth Violence Prevention Center, School of Public Health, University of Michigan, 1415 Washington Heights, Ann Arbor, MI 48109

[f]Department of Psychiatry, University of Michigan, Ann Arbor, MI 48109, USA

[g]Department of Obstetrics & Gynecology, University of Michigan, Ann Arbor, MI 48109, USA

Abstract

Purpose.—To describe the transition patterns into and out of post-traumatic stress (PTS) for youth and identify social supports preceding these transitions.

Methods.—We used inhomogeneous, continuous-time, [1]Markov Chain models to model transitions in and out of PTS using data from Waves 1, 3, 4, and 5 of the National Survey of Child and Adolescent Wellbeing (NSCAW I)—a longitudinal study of children who first had contact

with the child welfare system between 1999 and 2000. Our analytic sample contained 915 individuals aged 11–17 years. We analyzed data in 2020.

Results.—Youth with stronger peer relationships were less likely to transition into PTS (HR: 0.82; 95% CI [0.70–0.96]), and these individuals were also more likely to transition out of PTS (HR: 1.21; 95% CI [1.04, 1.42]). Youth with adult support were less likely to transition into PTS at any given time interval (HR: 0.37; 95% CI [0.17–0.78]), but adult support was not associated with the transition out of PTS.

Conclusions.—Strengthening peer relationships may help at-risk children both avoid PTS altogether and recover from PTS after its onset. Promoting adult support, however, may only be most effective when attempting to prevent PTS-onset.

Keywords

post-traumatic stress; child welfare; longitudinal; social support

1. Introduction

Annually, around 3.5 million youth are the subjects of child maltreatment investigations in the United States (*Child Maltreatment 2017*, 2019). Circumstances that bring a child to the child welfare system's attention are often traumatic, such as experiencing or witnessing violence (Garcia et al., 2017; Greeson et al., 2011; Kisiel et al., 2009). These traumatic circumstances increase risk for post-traumatic stress (PTS) (Arata, 1999; Brewin et al., 2000; Lansford et al., 2002; Runyon & Kenny, 2002; Salazar et al., 2013; Widom, 1999). Over 11% of youth referred to child welfare for investigation of abuse or neglect exhibit post-traumatic stress disorder (Kolko et al., 2010), and the lifetime prevalence is closer to 20% (Salazar et al., 2013).

A host of factors increase the likelihood that a child involved in the welfare system will display PTS, including experiencing complex trauma (Greeson et al., 2011), being placed out-of-home (Kolko et al., 2010), and exhibiting depressive symptoms (Kolko et al., 2010). Children who exhibit PTS have not always had PTS, and many of these children may recover from PTS, but we have little research on what predicts those transitions. Prospective prediction of PTS transitions could provide information on leverage points for preventing development of PTS (secondary prevention) and facilitating recovery from PTS (tertiary prevention).

As illustrated in Figure 1, the authors propose the progression of PTS exists in three states: 1) experience of the traumatic event; 2) internalization of trauma and onset of PTS; and 3) trauma recovery. In addition to progressing through states unidirectionally, individuals can move from recovery back to re-experiencing PTS, perhaps due to some incident that elicits previous traumatic stress (van Dis et al., 2019). Individuals can also move directly from experiencing a traumatic event to trauma recovery without ever exhibiting PTS (Witt et al., 2019). Opportunities for primary, secondary, and tertiary prevention of PTS exist along these paths (Caplan & Grunebaum, 1967; Simeonsson, 1991). Primary prevention is universally delivered with the goal to reduce the likelihood that trauma will occur in the first place.

Secondary prevention is delivered to individuals who have experienced trauma who are at risk for PTS—but who do not yet exhibit PTS—in an effort to prevent PTS and move individuals from the traumatic experience to trauma recovery. Lastly, tertiary prevention is delivered to individuals who exhibit PTS to move individuals into a state of trauma recovery.

The majority of PTS prevention focuses on children who have experienced trauma—regardless of early symptom levels—failing to distinguish between secondary and tertiary prevention (Feldner et al., 2007). These prevention efforts are also clinical, with little exploration of promotive factors that public health approaches can strengthen to prevent or address PTS (Everly Jr. & Boyle, 1999). Drawing from the Transactional Theory of Stress and Coping, social supports (and settings designed to promote social supports) buffer (protect against) the relationship between a stressor (i.e., child maltreatment) and a maladaptive stress response (i.e., PTS)—the goal of secondary prevention. Resiliency Theory provides additional guidance on how such social supports may help mitigate the negative effects of trauma both prior to developing PTS (i.e., secondary prevention) and after PTS onset (i.e., tertiary prevention) (Fergus & Zimmerman, 2005). Specifically, social support may buffer against risk for maladaptive coping or might compensate for the negative effects of trauma (Luthar and Cicchetti, 2000).

Particularly among children and youth, it is critical to identify potential leverage points for prevention of PTS among children who have been in the child welfare system. Sources of social support for children and youth include adults as well as peers, who become increasingly important across development (Parker et al., 2006; Prinstein & Dodge, 2008; Rubin et al., 2013), and contexts that build support can be both within school settings and the community. Thus, this study sought to test the association between social supports at three levels—the interpersonal (i.e., peer relationships and adult support), group (i.e., school engagement), and community (i.e., community involvement) level—and transitions in and out of PTS among children and youth in the child welfare system.

To test the model of trauma progression and recovery, this study used inhomogeneous, continuous-time, Markov Chains among a nationally representative sample of children involved in the child welfare system to: 1) describe the transition patterns into PTS and recovery from PTS; and 2) identify social supports preceding these transitions. The team hypothesized higher levels of social support are inversely associated with transitioning into PTS (i.e., indicating that social support may function as a secondary prevention strategy), and also receiving social support is associated with transitions out of PTS (i.e., indicating that social support may function as a tertiary prevention strategy). Results will inform efforts to identify strategies specific to secondary- and tertiary-prevention interventions addressing PTS among youth.

2. Methods

2.1 Study Sample.

The authors used data from the National Survey of Child and Adolescent Wellbeing (NSCAW I). The full NSCAW sample consists of 6,228 children, ages 0–14 at baseline, who had been the subjects of investigation by the child welfare system between October 1999

and December 2000 (Dowd et al., 2004). Data collection occurred in five waves over eight years, and we presently use data from four waves: at the close of investigation (Wave 1), 18 months (Wave 3), 36 months (Wave 4), and 59–96 months (Wave 5) post-investigation (Dowd et al., 2004). Traumatic stress symptoms were not assessed at Wave 2.

Authors structured data with multiple data rows per respondent—a row per each wave with the respondent's age in years documented—each row known as a 'person-age.' For the analytic sample, authors included person-age data from any measurement occasion when an individual was between ages 11–17 years (i.e., the ages with complete information on focal variables for the present analyses) and had information on the outcome and predictor. The team excluded respondents with complete information at only one assessment, as multiple assessments are required to assess transitions, and also excluded individuals who were home-schooled, as these individuals were not surveyed for information on key variables. The analytic sample contained 915 individuals, which included 1234 consequent (i.e., "back-to-back") measurement pairs (average 1.3 transitions per respondent). The Institutional Review Board at the University of Michigan approved this analysis.

2.2 Measures.

The focal independent variables included various forms of social support, whereas the dependent variable was PTS. Analyses controlled for factors known to influence social support and post-traumatic stress, but we did not include variables on the causal path between social support and post-traumatic stress, as doing so would bias estimation (VanderWeele & Robins, 2007). Covariates included: child sex; child age; frequency of different maltreatment types; child welfare worker's initial risk assessment; internalizing behaviors; externalizing behaviors; and receipt of any financial assistance.

2.2.1 Post-traumatic stress.—At Waves 1, 3, 4, and 5, individuals who were between 8–17 years completed an adapted Trauma Symptom Checklist for Children (TSCC) post-traumatic stress scale, a tool used to assess the effects of childhood trauma through the child's self-report of trauma symptoms (Briere, 1996). The tool has demonstrated strong internal consistency and concurrent validity (α=0.87, r=0.72–0.80) (Briere, 1996). For each item, the respondent recorded the frequency with which the statement pertains to her/him on a 4-point scale ranging from 0 (never) to 3 (almost all the time). Standardized T-scores between 60–65 for the post-traumatic stress scale represent subclinical symptomology (i.e., post-traumatic stress), whereas scores at or above 65 are considered clinically significant (i.e., post-traumatic stress disorder), thus we operationalize PTS as a T-score ≥ 60 (Briere, 1996).

2.2.2 Peer relationships.—At Waves 1, 3, 4, and 5, individuals ≥ 8 years completed the Loneliness and Social Dissatisfaction for Young Children scale (α = 0.89), which evaluated peer relationships for children enrolled in school (e.g., I can find a friend when I need one; I have friends at school) (Asher & Wheeler, 1985; Dowd et al., 2004). Items scored on a five point scale (i.e., never = 1…always = 5). The authors scaled items so higher values indicated stronger peer relationships and averaged all 15 items to create a total peer relationship quality score, which ranged from 1 to 5.

2.2.3   Adult support.—To assess social support from adults, at Waves 1, 3, 4, and 5, individuals who were 11 years were asked four yes/no questions (Runyan et al., 1998): 1) Is there an adult or adults you can turn to for help if you have a serious problem; 2) Do you feel you can go to a parent or someone who is like a parent with a serious problem?; 3) Could you go to another relative (not a parent) with a serious problem?; and 4) Has there ever been an adult outside of your family who has encouraged you and believed in you? Due to the skewed distribution of adult support summary scores, we used these four variables to create a dichotomous adult support variable. Authors operationalized respondents who indicated 'yes' for all adult support questions as having adult support present (i.e., adult support = 1).

2.2.4   School engagement.—To assess school engagement, individuals who were 6 years at Wave 1, 3, 4, and 5 completed a series of 11 questions pertaining to school achievement and the student's disposition toward learning and school (e.g., How often do you enjoy being in school?) on a four-point Likert-type scale (i.e., never = 1…always = 4). Authors scaled items so that higher values indicated stronger school engagement and averaged all items to create a total school engagement score, which ranged from 1 to 4.

2.2.5   Community involvement.—To assess community involvement, at Waves 1, 3, 4, and 5, individuals who were 11 years were asked if they had attended a peer support group within the past six months (yes/no) or a community youth center within the past six months (yes/no). Authors created a dummy variable that indicated if an individual had attended either a peer support group or community youth center.

2.2.6   Frequency of maltreatment.—At each wave, caregivers provided information regarding the frequency of child psychological abuse, physical abuse, and neglect via an audio computer assisted self-interview (ACASI). Caregivers answered thirteen questions regarding the number of physical assaults (e.g., how many times have you hit your child with a fist or kicked hard), five questions regarding psychological aggressions (e.g., how many times have you shouted, yelled, or screamed at your child), and five questions regarding neglect episodes (e.g., how many times have you left your child home alone, even when some adult should be with them) that they committed against the child in the past 12 months. Seven response options ranged from 0 (0 times) to 25 (more than 20 times). Due to low frequency, authors did not control for sexual abuse. At each Wave, authors summed items within the physical abuse, psychological abuse, and neglect domains to obtain wave- and maltreatment-specific scores.

2.2.7   Risk assessment.—At Wave I, caseworkers also identified family risk factors based on the information available to them at the time of the case investigation, but not based on a standardized measure. Specifically, caseworkers assessed the probability of abuse in the next 12 months if no services were provided, ranging from very low to very high. The present analyses included these probabilities as a series of three dummy variables (i.e., very low [reference], low, high, very high), with very low probability of abuse serving as the reference category.

2.2.8   Internalizing and externalizing behaviors.—At each wave, caregivers provided information for internalizing and externalizing behaviors in childhood via completing the Child Behavior Checklist (CBCL, α = 0.80–0.92) (T. M. Achenbach, 1991a). For children whose caregivers did not complete the CBCL, we substituted a parallel measure completed by the child, the Youth Self-Report (α = 0.80–0.81)(T. Achenbach, 1991) and when child and caregiver report were not available, we used the Teachers Report Form (α = 0.80–0.81)(T. M. Achenbach, 1991b)—both measures that correlate with the CBCL. The CBCL and parallel questionnaires divide into internalizing and externalizing behavior domains, and authors used continuous percentile scores for these two domains.

2.2.9   Financial assistance.—At all waves, current caregivers indicated whether anyone in the household was currently receiving any financial assistance, and authors created an indicator variable that described whether or not financial assistance in the household was present. Given the low response rate for household income, the study team elected to use "financial assistance" as a proxy for financial strain.

2.3   Analysis.

The primary goals were to: 1) determine the contributions of various social support providers and contexts to transitions in PTS across the four waves of data collection; and 2) evaluate if the associations between various social supports and PTS transitions depended on the current PTS state (i.e., no PTS or PTS). The Markov Chain model focuses on predictors of changes in an outcome, and it provides a basis for testing whether covariate effects differ depending on current PTS status (i.e., whether predictors of *new* PTS differ from predictors of *sustained* PTS). Therefore, to obtain adjusted covariate effects on PTS transitions, authors used inhomogeneous Markov Chain models using the MSM package of R (Jackson, 2011). Analyses report effects in terms of exponentiated regression coefficient estimates, which correspond to an adjusted hazard ratio from state i to state j for a one-unit increase in the covariate. For example, if state i is "No-PTS" and j is "PTS", these hazard ratios quantify the effect of each covariate on the likelihood of initiating PTS, thus suggesting targets for secondary prevention. Conversely, if state i is "PTS" and j is "no-PTS", these hazard ratios quantify the effect of each covariate on the likelihood of recovering from PTS, thereby suggesting targets for tertiary prevention.

To achieve the primary analytic goals, the study team built the Markov Chain model in a series of steps. First, authors entered all social support variables and covariates into the model, allowing each variable to have a unique coefficient per transition. Next, following a method employed by Goldstick and colleagues (Goldstick, Carter, et al., 2019; Goldstick, Walton, et al., 2019), the team individually tested whether each variable's effect on future PTS differed depending on the current PTS state with a series of likelihood ratio tests. Specifically, the team tested whether the No-PTS -> PTS adjusted hazard ratio for each variable included in the model (i.e., fourteen variables) was equivalent to the inverse of the adjusted hazard ratio from PTS -> No-PTS, which amounts to a test of whether the likelihood of being in the PTS state given the value of the specific variable differs depending on the current state (Goldstick, Carter, et al., 2019). Finally, the team constructed a final model, with covariate effects constrained to be state-invariant, except those that we found to

have significant state-dependence in the prior step. Given the current state of the MSM R package, authors did not account for complex survey design features of the NSCAW data. Authors conducted all analyses in January 2020.

3. Results

The analytic sample contained 915 individuals, which included 1234 transitions over the ages of 11–17 years (average 1.3 transitions per respondent). 973 of these transitions (79%) represented No-PTS followed by No-PTS. 116 transitions (9%) represented No-PTS followed by PTS. 87 transitions (7%) represented PTS followed by No-PTS. 58 transitions (5%) represented PTS followed by PTS. Table 1 presents descriptive statistics stratified by wave of data collection.

When specifying the Markov Chain model, the series of likelihood ratio tests among all fourteen variables included in the final model indicated that the effect of having adult support on future PTS differed depending on the current PTS state ($p < 0.01$). All other covariate effects were state-invariant. Table 2 shows the final fitted Markov Chain model, with covariate effects displayed as hazard ratios (HR). The Pearson test with a p-value calculated from boot-strapped samples (Jackson, 2011) supplied no evidence of lack-of-fit ($p = 0.13$). Youth with stronger peer relationships were less likely to transition into PTS at any given time interval compared to individuals with weaker peer relations. Specifically, each one-point increase on the peer relationship variable slowed the transition rate by 18% (HR: 0.82; 95% CI [0.70–0.96]), holding all other variables in the model constant. Youth with stronger peer relationships were also more likely to transition out of PTS (HR: 1.21; 95% CI [1.04, 1.42]), holding all other variables in the model constant.. Youth with adult support were less likely to transition into PTS at any given time interval compared to individuals without adult support (HR: 0.36; 95% CI [0.17–0.78]), but adult support was not associated with the transition out of PTS. No other covariate effects were significant.

4. Discussion

Results suggest that support from peers and adults, but not broader supports such as school engagement or community involvement, help neutralize the effects of risks for predicting moving into PTS. Our findings add nuance to the growing body of literature that demonstrates the compensating nature of social support to counteract the risk of maltreatment for post-traumatic stress (Ahrens et al., 2008; Bokhorst et al., 2010; Lauterbach & Armour, 2016). Specifically, distinct secondary- and tertiary-prevention interventions may be more effective in preventing and addressing PTS among children compared to prevention strategies that do not discriminate based on symptom levels (Figure 1). Although strengthening peer relationships may help at-risk children avoid PTS altogether and recover from PTS after its onset, promoting adult support may only be effective when attempting to prevent PTS-onset.

The compensatory model of resiliency theory suggests that positive factors in a child's life may counteract risk factors (Zimmerman et al., 2002). Decades of research has illustrated that adult mentorship and peer friendships can build resiliency in youth, reduce the

likelihood of risky behaviors, and improve interpersonal relationship skills (Ahrens et al., 2008; Beier et al., 2000; Bolger et al., 1998; M.D et al., 2007; Powers et al., 2009; Price, 1996; Zimmerman et al., 2002). In the present study, authors found evidence that peer relationships and adult support may mitigate the stress associated with trauma, thus preventing PTS. Among youth who already exhibit PTS, however, adult support does not lend to trauma recovery similar to that of peer friendships. The authors hypothesize that although an adult support can serve as a platform for building coping skills among youth who are at risk for trauma and PTS, the development of this resiliency is more difficult to master after PTS develops. The form, number, and importance of peer relationships, however, continues to change and grow during the adolescent period (Bokhorst et al., 2010; DuBois & Silverthorn, 2005). Thus, newly formed or deepened peer relationships may provide youth a context in which to prevent and/or recover from PTS.

Presently, we evaluated social supports at three levels: interpersonal (i.e., peer relationships and adult support), group (i.e., school engagement), and community (i.e., community involvement) level. Only interpersonal supports emerged as protecting against PTS. This may be due to several reasons. First, interpersonal relationships can offer various types of support, including informational, appraisal, instrumental, and emotional support. Platforms for school engagement and community involvement, however, may not provide the same depth of emotional support as interpersonal relationships (Belford et al., 2012; Liang et al., 2010). An alternative explanation for the lack of protection by school engagement and community involvement could be measurement. Specifically, NSCAW included only two community involvement questions, and authors operationalized community involvement as a dichotomous variable. Future work should investigate relationships between more comprehensive measures of community involvement and PTS among youth.

4.1 Limitations.

Limitations include the inability to include a comprehensive measure of community involvement, described above, as well as analyses not discriminating between positive and deviant peer affiliations. Thus, findings may not generalize to all conceptualizations of community involvement nor peer relationships; future studies should include more comprehensive social support measures and investigate important nuances within peer relationships. Additionally, data collection for this NSCAW cohort began two decades ago. While we expect that our conceptual model of trauma progression and recovery generalizes to the present, future cohort studies should continue to empirically evaluate this model to identify additional secondary and tertiary prevention levers for addressing post-traumatic stress. Finally, analyses did not account for the complex survey design features of NSCAW when conducting our analyses. Thus, analyses lend themselves to relationships between variables rather than inferences to the population.

5. Conclusions

Promoting peer relationships and adult support among children and youth both pre- or immediately post-trauma lends promise as a secondary prevention effort against PTS. The promotion of peer relationships may remain as an effective tertiary prevention point. Future

developmentally informed efforts may consider how these relationships may be the focus of PTS prevention interventions among youth.

Acknowledgements:

Glossary

ACASI	Audio Computer-Assisted Self-Interview
CBCL	Child Behavior Checklist
NSCAW	National Survey of Child and Adolescent Wellbeing
HR	Hazard Ratio
PTS	Post-Traumatic Stress
PTSD	Post-Traumatic Stress Disorder
TSSC	Trauma Symptom Checklist for Children

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- Peer relationships and adult support can help traumatized youth avoid post-traumatic stress

- Peer relationships can also help traumatized youth avoid post-traumatic stress

- Social support intervention foci for post-traumatic stress differ based on baseline symptoms
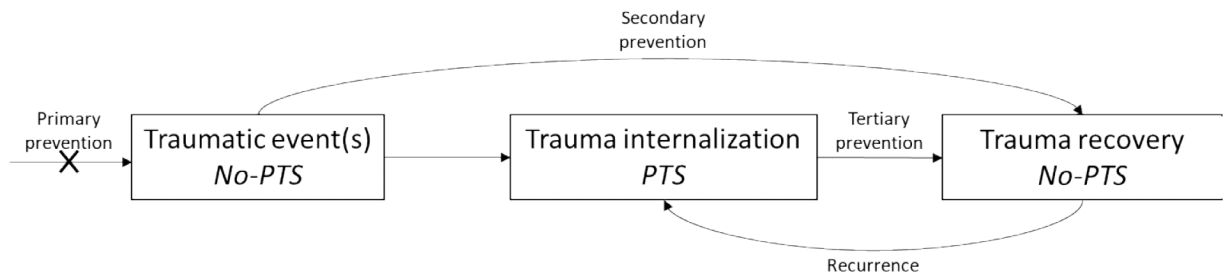
Figure 1.
Conceptual model of trauma progression and recovery.

Table 1.

Descriptive statistics stratified by wave of data collection.

	Wave 1	Wave 3	Wave 4	Wave 5
PTS	15%	15%	11%	12%
Social support				
Peer relationships	4.18 (0.71)	4.20 (0.68)	4.27 (0.64)	4.32 (0.63)
Adult support	71%	76%	77%	81%
School engagement	3.06 (0.43)	3.08 (0.44)	3.10 (0.46)	3.08 (0.44)
Community involvement	44%	37%	40%	32%
Covariates				
Age	12.7 (1.26)	13.2 (1.60)	13.7 (1.89)	15.8 (0.88)
Male	41%	42%	45%	48%
Financial assistance	57%	56%	57%	60%
Physical abuse	5.16 (8.38)	3.55 (8.08)	2.99 (7.23)	2.07 (11.5)
Psychological abuse	21.1 (21.9)	16.3 (19.5)	15.6 (19.5)	12.2 (18.9)
Neglect	5.00 (9.96)	3.87 (7.71)	3.43 (7.37)	3.34 (9.58)
Risk assessment				
Very low risk	9%	15%	15%	17%
Low risk	31%	33%	32%	28%
High risk	34%	30%	27%	28%
Very high risk	26%	22%	26%	27%
Internalizing	66.4 (30.7)	60.4 (30.9)	58.5 (31.1)	53.8 (32.2)
Externalizing	75.1 (27.1)	70.6 (28.9	68.0 (29.8)	62.6 (30.5)
N	367	685	806	304

Note: PTS = Post-traumatic stress

Table 2.

Adjusted Markov Chain transition model for transitions between PTS states

	HR (No PTS → PTS)	HR (PTS → No PTS)
Social support		
Peer relationships	**0.82 (0.70–0.96)**	**1.21 (1.04–1.42)**
Adult support[a]	**0.36 (0.17–0.78)**	0.59 (0.29–1.24)
School engagement	1.03 (0.79–1.34)	0.97 (0.75–1.27)
Community involvement	0.94 (0.76–1.16)	1.06 (0.86–1.31)
Covariates		
Male	1.08 (0.87–1.34)	0.93 (0.75–1.14)
Financial assistance	0.96 (0.78–1.19)	1.04 (0.84–1.29)
Physical abuse	0.99 (0.98–1.01)	1.01 (0.99–1.02)
Psychological abuse	**1.01 (1.00–1.01)**	**0.99 (0.98–0.99)**
Neglect	0.99 (0.99–1.01)	1.00 (0.99–1.01)
Risk assessment		
Low risk	1.26 (0.88–1.82)	0.79 (0.55–1.14)
High risk	1.37 (0.94–1.99)	0.73 (0.50–1.06)
Very high risk	1.38 (0.95–1.99)	0.73 (0.50–1.05)
Internalizing	1.00 (0.99–1.01)	0.99 (0.99–1.00)
Externalizing	1.00 (0.99–1.01)	0.99 (0.99–1.00)

PTS = Post-traumatic stress

Bold indicates $p < 0.05$

HR = Hazard ratio

[a]Effects are not constrained across states