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The Relationship Between Post-Traumatic Stress Symptoms and Substance Use Among Adolescents Involved with Child Welfare: Implications for Emerging Adulthood

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Abstract The purpose of the present study was to examine the role of posttraumatic stress symptoms (PTSS) in predicting substance use and substance-related problems in a sample of older youth and emerging adults involved with child welfare. The sample was drawn from the Maltreatment and Adolescent Pathways (MAP) longitudinal study (Wekerle et al. 2009). Participants were 253 youth and emerging adults (ages 15–20; M=16.87, SD=1.04; 61.4% female and 38.6% male) who were involved with child welfare. Multiple regression analyses were conducted to examine the impact of PTSS using subscales from the Trauma Symptom Checklist for Children (TSCC; Briere 1996). Outcome variables were past year alcohol, marijuana and illicit drug use; as well as alcohol and drug problems. Controlling for gender, age, child welfare status and child maltreatment, both dissociation and anger emerged as significant predictors of substance use and related problems. The implications of these findings for older youth and emerging adults exiting the child welfare system are discussed.

Keywords Substance use · PTSD · Child maltreatment · Child welfare · Adolescence · Emerging adulthood

The maltreatment of children is an international public health concern, with clear and significant consequences for maltreatment survivors throughout the lifespan. Definitions of

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child maltreatment vary across studies, but most commonly include sexual abuse, physical abuse, emotional abuse and neglect. In the US, the rate of child maltreatment is estimated at 10.1 per 1000 children (US Department of Health and Human Services [USDHHS] 2010). In both the US and Canada, neglect is the dominant child maltreatment type (USDHHS 2010; Public Health Agency of Canada 2010; Trocmé et al. 2010). Substantiated cases refer to those where there has been an investigation and there is sufficient evidence to confirm maltreatment. Although substantiation on more than one form of child maltreatment is significant, neglect is the most prevalent *stand alone* form (USDHHS 2010). Uniquely, Canadian statistics detail exposure to intimate partner violence (IPV), separated from other forms of emotional child maltreatment. In Canada, both neglect and IPV exposure are the two highest categories of child maltreatment (Public Health Agency of Canada 2010; Trocmé et al. 2010). For both countries, sexual abuse reported to child protection services is the lowest category, under 10% of substantiated cases. Because definitions of child maltreatment vary across studies, it is difficult to compare rates of abuse and neglect across Western and non-Western societies. It is clear, however, that child maltreatment is a widespread problem. Pereda et al. (2009) reviewed international rates of childhood sexual abuse across 28 countries, including several non-English speaking, non-Western countries (e.g., China, El Savador, South Africa). They found that rates and definitions of sexual abuse varied across countries, but the most frequent rates were below 10% for men and between 10% and 20% for women, although almost 30% of studies reported rates exceeding 30%. These findings highlight the alarming rate at which childhood sexual abuse is occurring worldwide, further emphasizing that child maltreatment is an issue of international importance.

In many cases, reported prevalence rates may underestimate actual rates of child maltreatment with most cases going unreported and evidence in many cases failing to meet criteria for substantiation (Gilbert et al. 2009). Child maltreatment can have severe and significant negative consequences for its young survivors. Of particular interest for the current study is the well-established relationship between child maltreatment and alcohol use, drug use and related problems among adolescents (e.g., for a review see Tonmyr et al. 2010).

Alcohol and drug use are common among adolescents. Findings from a national survey of American adolescents indicate that more than one-quarter tried substances before entering high school with alcohol the most commonly used substance (Johnston et al. 2007). Consistent with findings from the American survey, alcohol is the most frequently used substance among adolescents in Canada. A recent national survey of Canadians ages 15 and older (Canadian Alcohol and Drug Use Monitoring Survey, Health Canada 2010) found that 75.5% of individuals ages 15–24 had used alcohol in the past year, and 11.7% were heavy frequent drinkers (i.e., consumed alcohol one or more times per week on average in the past year and typically consumes 5 or more drinks per drinking occasion) (Health Canada 2010). In addition, 15.1% of Canadians in the 15–24 year old age range had experienced at least alcohol-related consequence in the past year. Cannabis is the most commonly used illicit drug among Canadians ages 15–24, with 26.3% reporting past year use. Overall, 15.4% of Canadians in this age range reported past-year substance use other than marijuana and alcohol, with hallucinogens (10.2%), cocaine/crack (5.9%), and ecstasy (6.5%) being the most commonly used substances. In terms of drug-related problems among 15–24 year old Canadians, 10.8% had ever experienced at least one drug-related consequence (Health Canada 2010). For both alcohol and drugs, consequences refer to problems experienced in several domains, including physical health, interpersonal, financial, academic, legal, learning, and housing.

Although substance use typically begins in adolescence (i.e., around age 13–14; Paglia-Boak et al. 2009), it peaks several years later. Individuals ages 18–24 consistently demonstrate the highest rates of substance use and substance-related problems. According to the Canadian Addiction Survey (Adlaf et al. 2005), rates of past year drinking and binge drinking (i.e., consuming 5 or more drinks on a single occasion) peak at 18 to 24 years of age. Rates of cannabis use are also highest among 18–24 year olds, with approximately 42% using cannabis in the past year. In addition, rates of use for all other drugs (e.g., hallucinogens, cocaine, ecstasy, inhalants, heroin) are highest among those ages 20–24. These findings suggest a period of risk for substance use between the ages of 18–24, which overlaps with what has now been identified as a distinct developmental stage: emerging adulthood (Arnett 2000). Specifically, researchers have characterized the late teens to early twenties as a period of development marked by identity exploration, instability, self-focus, feeling in-between, and exploration of possibilities (Arnett 2004)

Emerging adulthood may also be a period of particular risk for substance use among adolescents who are involved with child welfare (Flynn and Vincent 2008). In Ontario, Canada, the upper age for mandatory provision of child welfare services is 16 years, and the age at which services are discontinued varies from 18 to 21. Adolescents may have different levels of involvement with child welfare; although all receive case management, some adolescents may be in care and living in an out-of-home placement (e.g., foster care, group home) whereas others may live independently. In 2005, there were 19,000 children in care in Ontario; over 7,500 of these children were 13–17 years old and 1,500 were over age 18 (Ontario Association of Children's Aid Societies 2010).

In Ontario, supports for adolescents involved with child welfare end between ages 18 and 21, overlapping with the many transitions occurring in emerging adulthood, including conflicts around identity and feeling 'in-between' (Arnett 2000, 2004; Erikson 1968), which may be further complicated when individuals are exposed to maltreatment within an attachment relationship. Specifically, when the maltreatment is perpetrated by the primary caregiver (e.g., a parent), either directly or through a failure to protect, the early environment fails to provide healthy opportunities for growth and exploration and there is no secure base from which adolescents can 'transition' to adulthood. In social cognitive (e.g., Dodge 2003) and social learning theory (Bandura 1977) terms, experiencing child maltreatment impairs the development of self-scripts regarding self-efficacy and self-agency, which are crucial for identity development. Substance use during adolescence and into emerging adulthood may reflect an attempt to manage the confusion and distress that arises during this transition (Arnett 2005), particularly for adolescents preparing to make the transition out of child welfare who are often navigating this developmental stage without traditional external supports (e.g., consistent adult mentors, extended family) (Arnett 2007).

Indeed, researchers have found that rates of substance use are higher among adolescents who are currently in the care of child welfare, and those who are leaving child welfare, than in the general population (Reid and Dudding 2006; Wekerle et al. 2009; Wilsnack et al. 1997). In a recent study among 17–19 year old adolescents leaving child welfare and, specifically, foster care, Narendorf and McMillen (2010) found that both alcohol and marijuana use significantly increased the year after adolescents left care. In addition, several factors emerged as positive and significant predictors of getting drunk in the past year, marijuana use in the past month and meeting criteria for a substance use disorder, including maltreatment history (sexual abuse) and conduct disorder. Investigating factors that contribute to substance use for adolescents beginning to transition out of the child welfare system would provide important information concerning the needs of these adolescents and

would assist with the development of policies and practice for working with adolescents as they begin this transition process.

One factor that may play an important role in the link between child maltreatment and substance use in adolescence and emerging adulthood is post-traumatic stress disorder (PTSD) or post-traumatic stress symptoms (PTSS). The diagnosis of PTSD involves experiencing symptoms in three areas in response to a traumatic event: 1) intrusive thoughts that involve a re-experiencing of the trauma, 2) persistent avoidance of trauma-related stimuli or emotional numbing, and 3) persistent symptoms of increased physiological arousal (American Psychiatric Association 2000). Previous researchers have established associations between childhood maltreatment history and PTSD/PTSS in adolescence (e.g., Kingston and Raghavan 2009) and between PTSD/PTSS and substance use (e.g., Lubman et al. 2007), with prospective investigations postulating that PTSD/PTSS in most cases precedes substance use (Wu et al. 2010). Lipschitz et al. (2003) found that within a sample of inner-city adolescents, PTSS predicted substance use, with PTSS being identified as preceding substance use. Where researchers have simultaneously examined child maltreatment, PTSD and substance use, significant relations have been uncovered. In a sample of adolescents who met criteria for either substance abuse or substance dependence, maltreatment history was found to predict lifetime PTSD (Danielson et al. 2009). Researchers have also reported that a history of interpersonal violence, including sexual abuse, physical abuse and witnessing violence, among adolescents is a risk factor for PTSD, comorbid with substance use and dependence (Kilpatrick et al. 2003).

The self-medication hypothesis is the most common model for explaining the link between PTSS and substance use. According to this theory, increased use of substances reflects an attempt to ameliorate PTSS (see Jacobsen et al., 2001 for a review), which may persist for years after the traumatic event. In particular, substances with anxiolytic properties (e.g., alcohol, cannabis, opioids) may be used in an attempt to alleviate PTSS such as hypervigilance and hyperarousal. In addition, use of substances may facilitate avoidance of trauma memories (i.e., re-experiencing symptoms) via emotional numbing.

Although the relationship between child maltreatment, substance use and PTSS is well established, few studies have examined how PTSS contribute to substance use for older adolescents and emerging adults involved with child welfare. This is surprising given that PTSD has been identified as the highest occurring diagnosis among adolescents involved with child welfare (Keller et al. 2010). In those studies that have explored the link between PTSS and substance use among adolescents involved with child welfare, the findings indicate that PTSS increase the risk for substance use and substance use disorders. Narendorf and McMillen (2010) found that PTSD approached significance in predicting the likelihood that older adolescents transitioning out of foster care got drunk in the past year. Vaughn et al. (2007) found that adolescents in a child welfare sample who met criteria for lifetime PTSD were more likely to engage in polysubstance use and to meet criteria for a substance use disorder.

In an earlier study involving the same sample used here, Wekerle and colleagues (Wekerle, Leung, Goldstein et al. 2009) examined the relationship between PTSS and marijuana use using data from the initial assessment of the Maltreatment and Adolescent Pathways (MAP) study, when participants ranged in age from 14 to 17. For female adolescents, PTSS significantly predicted past year marijuana use over and above background variables (age, child welfare status) and child maltreatment. This study was cross-sectional and utilized a combined score for examining PTSS (i.e., number of subscales exceeding the clinical cut-off on the Trauma Symptom Checklist for Children;

TSCC; Briere 1996). In the present study, we explore the contribution of multiple PTS symptoms, including other symptoms frequently associated with trauma experiences (e.g., anxiety, depression, anger) and individual components of PTSD (e.g., dissociation). This provides additional information regarding the specific symptoms of PTS that may be associated with substance use among older adolescents in the care of child welfare.

Furthermore, although researchers have identified the importance of PTSS in the relationship between childhood maltreatment and substance use, further studies examining this association in child welfare samples are needed. Based on previous research findings, examining the impact of PTSS may be valuable in understanding the mechanism by which maltreatment poses a risk for later substance use among those involved with the child welfare system. Based on the current literature, emerging adults transitioning out of child welfare may be at-risk for increased substance use and therefore represent a critical period of investigation. The purpose of the current study was to examine how PTSS contribute to substance use and substance-related problems in a sample of older adolescents and emerging adults involved with child welfare.

Method

Participants

Participants were adolescents in the Maltreatment and Adolescent Pathways (MAP) longitudinal study. The MAP is a study of adolescents involved with child welfare in Ontario, Canada. Adolescents are randomly selected from the active caseloads of child welfare services in a large urban catchment area, which handles a sizable number of Canada's child welfare cases. Adolescents involved with child welfare in Ontario are either Crown wards (parental rights are terminated and the government becomes the child's legal parent and has the rights and responsibilities of a parent), society wards (the child is placed in the care and custody of child welfare for a period of up to 12 months), in community family/voluntary care (the child is voluntarily placed temporarily in the care of child welfare), or in interim care (the child is temporarily in the care of child welfare usually due to a recent apprehension or court adjournment in a child protection hearing).

Adolescents were screened by caseworkers to determine eligibility for participation. Participants were considered ineligible if they: were outside the age range (14–17 years old at the initial assessment) (N=39), had a developmental delay (N=122), were absent without leave (i.e., had terminated contact with their child welfare caseworker) (N=75), or were deemed to be in crisis (psychiatric, self-harm, residential) (N=85). Of those deemed eligible by their child welfare caseworker (N=837), the recruitment rate was 67.0%, resulting in an initial sample of 561 adolescents (52.0% female). Additional details about recruitment and informed consent procedures are available in Wekerle, Leung, Wall et al. (2009).

Data for the current analyses were drawn from three assessment points: initial (Time 1), 6 months (Time 2) and 1 year (Time 3). Specifically, we were interested in the relationship between child maltreatment at the initial assessment, PTSS at the second assessment, and substance use and consequences at the third assessment. We chose these timepoints to more clearly articulate the chronological relationship between child maltreatment, PTSS and substance use and consequences. Participants for the current analyses were 253 adolescents for whom complete data was available on the variables of interest at the initial, 6-month and 1-year assessment points (61.4% female and 38.6% male). Participants ranged in age from 15 to 20 (M=16.87 SD=1.04).

Participant Retention In total, 561 adolescents participated in the Time 1 testing (initial; 260 males and 301 females). At Time 2 (6 months), there were 428 participants, resulting in a retention rate of 76.3%. To date, 322 participants have completed the Time 3 assessment (1 year), which represents a 75.2% retention rate from Time 2 and a 57.4% retention rate from Time 1. For the present study, we included only those participants who provided complete data on the variables of interest (N=253). We examined differences between the current sample and the initial recruitment sample on demographic and background variables assessed at the initial testing (Time 1). Participants who were included in the current analyses were more likely to be female (47.2% Time 1 only vs. 61.4% current study; p<.001) and Crown wards (56.4% Time 1 only vs. 65.7% current study; p<.05). In addition, participants in the current sample had been involved with child welfare for significantly longer: Time 1 only M=4.33 years, SD=4.14, current study M=5.62 years, SD=4.56 (p<.05). There were no differences between Time 1 only participants and participants in the current study on: age, ethnicity, and rates of moderate to severe maltreatment (physical, sexual and emotional abuse; physical and emotional neglect) assessed at Time 1.

Procedures

Adolescents received an explanatory letter outlining the purpose of the study, risk/benefits to participation, freedom to withdraw, and limits of confidentiality. Adolescents age 16 and over provided their own consent to participate; consent from a legal guardian was required for adolescents under age 16. Additional information regarding procedures for managing risk and issues of confidentiality are outlined in Wekerle, Leung, Wall et al. (2009). Participants completed questionnaires via a laptop computer in the presence of a research assistant. Participants could choose the location of the testing (i.e., child welfare agency, public place in the community, at home) and most chose to be tested in their place of residence (80%). Each session was approximately 2.5 h in duration. Participants were paid $28.00 at each testing session. In addition, refreshments were provided and transportation costs were reimbursed.

Measures

Child Maltreatment Child maltreatment was assessed with the Child Trauma Questionnaire—Short Form (CTQ-SF; Bernstein et al. 2003). The CTQ-SF is a 28-item questionnaire, which measures five types of maltreatment, including three forms of abuse (physical, sexual, emotional) and two forms of neglect (physical and emotional). Participants rate early childhood experiences (e.g., “People in my family hit me so hard that it left me with bruises or marks”) using a five-point Likert scale based on frequency of the event (1=Never True, 2=Rarely True, 3=Sometimes True, 4=Often True, 5=Very Often True). A subscale score is generated for each subtype of maltreatment and summing all 5 subscales produces a total CTQ score. Other researchers who have utilized a total CTQ score, have demonstrated the significant relation of maltreatment to physical health (Carpenter et al. 2010) and to psychopathology (Savitz, et al. 2008; Simon et al. 2009).

The CTQ has demonstrated good internal validity with a subset of participants from the current sample (n=52), with Cronbach’s alphas for the subscales ranging from .85 to .92 for abuse subscales and .68 to .87 for neglect subscales (Wekerle, Leung, Goldstein et al. 2009). In the same sample, test-retest reliability was found to be adequate, with correlations ranging from .52 to .70 (Wekerle, Leung, Goldstein et al. 2009). Moreover, along with

possessing good criterion-validity, the CTQ has demonstrated its utility as a screening measure for maltreatment across varied populations, including adult substance abuse patients (Bernstein et al. 2003).

Post-Traumatic Stress Disorder Symptoms Symptoms of PTSD were assessed with the Trauma Symptom Checklist for Children (TSCC; Briere 1996). The TSCC is a 54-item self-report questionnaire which assesses six areas of functioning: anxiety, depression, post-traumatic stress, dissociation, anger and sexual concerns. Participants are asked to rate how frequently they experienced specific events (e.g., remember things that happened that I did not like) on a 4-point Likert scale (1=Never, 2=Sometimes, 3=Lots of times, 4=Almost all of the time).

Using a subset of participants from the present sample, internal consistency for the TSCC subscales was high, with Cronbach's alphas ranging from .82-.89. In addition, test-retest reliability fell in the moderate range (r=.50) (Wekerle, Leung, Goldstein et al.). The posttraumatic stress subscale has been found to accurately discriminate between adolescents who do and do not have abuse histories (Sadowski and Friedrich 2000). For the present analyses, we converted subscale scores to *T*-scores based on the normative data for gender and age (13–16 years) provided in the TSCC manual. Briere (1996) has reported that 16 year-old TSCC norms can be used with 17 year-old youth.

Alcohol, Marijuana and Illicit Drug Use Marijuana and other illicit drug use were assessed with items from the Ontario Student Drug Use Survey (OSDUS; Adlaf and Paglia-Boak 2005). For past year alcohol use, participants indicated the frequency with which they consumed alcohol in the past year, ranging from never or less than once in the past 12 months to weekly. We examined use of alcohol and marijuana separately from other substances. For past year frequency of marijuana and other illicit drugs, response options ranged from 1 to 2 times to 40 or more times in the past year. For marijuana use, we collapsed across categories, resulting in four groups: never used or not in the past year, used 1–5 times in the past year, used 6–19 times in the past year and used 20+ times in the past year. In addition, use of other illicit drugs was examined together in one category, which included: glue or solvents, barbiturates, heroin, methamphetamines, LSD and PCP (and other hallucinogens), cocaine, crack cocaine, ecstasy, and non-prescribed stimulants, tranquilizers and methylphenidate (Ritalin). For each illicit drug, we first created a dichotomous variable reflecting use in the past year (yes/no) and then combined them to create a total score (number of illicit drugs used in the past year).

Alcohol Problems Alcohol-related problems were assessed with the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al. 1993), a 10-item self-report measure that screens for problematic alcohol use. The AUDIT has been found to reliably identify people with risky drinking practices (Piccinelli et al. 1997; Adewuya 2005). In a review of the literature, the AUDIT's sensitivity was found to range from .51 to .97 and its specificity to range from .78 to .96 (Fiellin et al. 2000). Each item on the AUDIT is scored out of 4 and a tally of these scores ranges from 0 to 40 for a total AUDIT score.

Drug Problems Drug use problems were assessed using the CRAFFT (Knight et al. 1999). The CRAFFT is a 6-item screener developed to assess alcohol or drug use problems with adolescents (14–18 years). For the present study, the CRAFFT was administered to examine problem drug use only. CRAFFT is a mnemonic that represents

six drug use contexts (e.g., Have you ever ridden in a **C**ar driven by someone (including yourself) who was high or had been using drugs?). Participants respond "yes" or "no" to each question and a total score is calculated based on the number of items that are positively endorsed (YES). A score of 2 or higher indicates problem substance use, warranting a fuller assessment of abuse or dependence (Cummins et al. 2003; Knight et al. 1999). In an earlier study, the CRAFFT demonstrated adequate test-retest reliability (r=.71 to .86) (Levy et al. 2004). In addition, the sensitivity and specificity of this measure has been reported to be good across varied populations of adolescents (Cummins et al. 2003; Knight et al. 1999; Knight et al. 2003).

Data Analysis

All data analyses were conducting using PASW Statistics 18.0 (SPSS 2010). The time points from which each of the variables were drawn is consistent with our hypothesized prospective model in which childhood maltreatment contributes to PTSS, which contributes to increased substance use and consequences. Specifically, the total CTQ score was obtained from the first assessment (Time 1), the TSCC subscale scores were obtained from the second assessment (Time 2) and the substance use and consequence scores (total AUDIT, total CRAFFT) were obtained from the third assessment (Time 3). Preliminary analyses involved examining the descriptive characteristics of the sample. In addition, we examined the bivariate correlations between all six of the TSCC subscales and each of the maltreatment variables (physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect) as well as the total CTQ score, and the correlations between the TSCC subscales and three measures of substance use (past year alcohol use, past year marijuana use and past year illicit drug use), a measure of problem alcohol use (total AUDIT score) and problem drug use (total CRAFFT score). Past year illicit drug use was a composite score reflecting the total number of illicit drugs (other than marijuana) used in the past year.

Subsequently, we used hierarchical linear regression to examine the contribution of PTSS over and above background variables (sex, age, child welfare status) and childhood maltreatment history (total CTQ score). Sex, age and child welfare status were entered on the first step as control variables. Total maltreatment scores were entered on the second step. All TSCC subscales were entered on the final step. We conducted five separate regression analyses, one for each of the outcome variables (past year alcohol, marijuana and illicit drug use, alcohol-related problems, drug-related problems). To determine the extent to which the trauma symptom subscales contributed to substance use and problems over and above maltreatment, we examined the change in variance accounted for with the addition of the final step (ΔR^2).

Results

Descriptive characteristics of the sample are listed in Table 1.

Bivariate correlations are listed in Table 2. With the exception of the association between sexual abuse and the Anger subscale of the TSCC, all types of maltreatment were positively and significantly associated with TSCC subscale scores. In addition, total scores on the CTQ were positively and significantly associated with all subscales of the TSCC, indicating that more frequent maltreatment was associated with greater symptoms associated with trauma.

Table 1 Descriptive characteristics of the sample (N=253)

Variable	Descriptive Statistics
Gender (%)	
Female	61.4
Male	38.6
Age in years (15–20) [M (SD)]	16.87 (1.04)
Ethnicity[a] (%)	
First Nations	1.2
Caucasian	27.3
African or Caribbean Canadian	24.9
Asian	5.0
Latin American	2.8
Multiple ethnicities	31.3
"Other"	7.6
Child Welfare Status (%)	
Crown ward	65.7
Society ward	12.6
Community family/voluntary care	17.7
Interim care	3.9
Child Maltreatment (% moderate to severe)	
Physical abuse	36.6
Sexual abuse	19.0
Emotional abuse	34.3
Physical neglect	36.6
Emotional neglect	39.4
Total maltreatment (25–125) [M (SD)]	49.13 (19.57)
Trauma Symptom Subscales [M (SD)]	
Anxiety (35–108)	45.33 (9.63)
Depression (36–106)	46.15 (9.91)
Anger (35–85)	43.87 (8.98)
Post-traumatic Stress (35–95)	45.74 (9.98)
Dissociation (36–99)	47.98 (11.01)
Sexual Concerns (36–175)	51.67 (19.61)
Substance Use (%)	
Past year alcohol use	40.3
Past year marijuana use	42.9
Past year other illicit drug use	19.3
Substance Use Problems [M (SD)]	
AUDIT (0–40)	3.36 (5.49)
CRAFFT (0–6)	0.98 (1.57)

[a] Percentages do not add to 100 due to some youth not indicating a primary ethnic identity. Multiple ethnicities refers to youth self-identifying as belonging to more than one ethnic group

The possible ranges for scores on the continuous variables are included in brackets. Total maltreatment score is a composite score based on the sum of the Child Trauma Questionnaire subscale scores; Scores for the Trauma Symptom Subscales are T-scores

Table 2 Bivariate correlations between TSCC subscales and: childhood maltreatment, past year alcohol, marijuana and illicit drug use, and alcohol and drug problems

	TSCC-Anxiety	TSCC-Depression	TSCC-Anger	TSCC-PTS	TSCC-Dissociation	TSCC-Sexual Concerns
Physical Abuse	.33***	.25***	.24***	.31***	.29***	.24***
Sexual Abuse	.27***	.22***	.10	.20***	.20***	.25***
Emotional Abuse	.36***	.33***	.32***	.36***	.36***	.31***
Physical Neglect	.30***	.27***	.20**	.28***	.28***	.19***
Emotional Neglect	.25***	.25***	.13*	.18**	.21***	.14*
Total CTQ	.39***	.35***	.26***	.35***	.35***	.30***
Past Year Alcohol Use	.02	.02	.15*	.06	.08	.04
Past Year Marijuana Use	.05	−.01	.12	.06	.10	.04
Past Year Illicit Drug Use	−.03	−.04	.01	−.01	.09	−.02
AUDIT	.02	−.01	.16**	.07	.13*	.02
CRAFFT	.08	.07	.18**	.13*	.20**	.01

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

CTQ Child Trauma Questionnaire; *AUDIT* Alcohol Use Disorders Identification Test; CRAFFT = Measure of problem drug use

Hierarchical regression analyses were conducted to examine the contribution of PTSS to substance use and substance use problems over and above background variables and maltreatment history. For both frequency of alcohol use and frequency of marijuana use in the past year, there was no significant increase in the amount of variance accounted for when the TSCC subscales were entered into the model (see Tables 3 and 4).

There was, however, a significant increase in the amount of variance explained for past year illicit drug use (see Table 5). In the final model, both child maltreatment (Total CTQ score) and scores on the TSCC Dissociation subscale were associated with use of a greater number of illicit drugs (other than marijuana) in the past year.

For alcohol problems (total AUDIT score), the addition of the TSCC subscales resulted in a significant increase in the amount of variance accounted for. As illustrated in Table 6, scores on the TSCC Anger and Dissociation subscales were associated with higher scores on the measure of problem alcohol use.

For drug problems (total CRAFFT score), the addition of the TSCC subscales resulted in a significant increase in the amount of variance accounted for (see Table 7). Consistent with the findings for alcohol problems, TSCC Anger and Dissociation subscales were positively associated with greater scores on the CRAFFT. The Sexual Concerns subscale was negatively associated with CRAFFT scores.

Discussion

The purpose of the present study was to examine the impact of PTSS on substance use and substance use problems in a sample of older adolescents involved with child welfare. Overall, the sample showed rates of alcohol use much lower than what is typical in community samples (e.g., Paglia-Boak et al. 2009), but rates of marijuana and other drug

Table 3 Hierarchical regression analysis predicting frequency of past year alcohol use from sex, child welfare status, childhood maltreatment, and PTSD symptoms

Variable	B	SE	β	R^2	ΔR^2
Step 1: Background variables				.047	
Sex (male vs. female)	.095	.139	.043		
Age	.217	.068	.209		
Child welfare status (Crown vs. other)	−.351	.149	−.156		
Step 2: Child maltreatment				.066	.019*
Maltreatment	.008	.003	.143		
Step 3: PTSD Symptoms				.105	.039
TSCC-Anxiety	−.015	.014	−.131		
TSCC-Depression	−.011	.013	−.101		
TSCC-Anger	.029	.011	.247		
TSCC-Post-traumatic Stress	−.003	.014	−.026		
TSCC-Dissociation	.009	.012	.093		
TSCC-Sexual Concerns	−.004	.005	−.076		

*p<.05; **p<.01.

Crown = Crown ward. Maltreatment reflects total score on the CTQ. *TSCC* Trauma Symptom Checklist for Children

use were higher. These findings have been reported elsewhere (Wekerle, Leung, Goldstein et al. 2009) and may reflect the nature of the current sample: youth who are currently involved with child welfare, the majority of whom are female and Crown wards. Previous research has found that rates of both alcohol and marijuana use (past month) increase in the year after youth leave care (Narendorf and McMillen 2010) indicating that there may be a

Table 4 Hierarchical regression analysis predicting frequency of past year marijuana use from sex, child welfare status, childhood maltreatment, and PTSD symptoms

Variable	B	SE	β	R^2	ΔR^2
Step 1: Background variables				.036	
Sex (male vs. female)	.255	.152	.106		
Age	.192	.074	.170*		
Child welfare status (Crown vs. other)	−.301	.163	−.122		
Step 2: Child maltreatment				.050	.029**
Maltreatment	.010	.004	.175**		
Step 3: PTSD Symptoms				.065	.037
TSCC-Anxiety	.001	.015	.005		
TSCC-Depression	−.034	.014	−.287*		
TSCC-Anger	.018	.012	.139		
TSCC-Post-traumatic Stress	−.002	.016	−.018		
TSCC-Dissociation	.020	.013	.192		
TSCC-Sexual Concerns	−.002	.005	−.041		

*p<.05; **p<.01

Crown = Crown ward. Maltreatment reflects total score on the CTQ. *TSCC* Trauma Symptom Checklist for Children

Table 5 Hierarchical regression analysis predicting number of illicit drugs used in the past year from sex, child welfare status, and childhood maltreatment, and PTSD symptoms

Variable	B	SE	β	R^2	ΔR^2
Step 1: Background variables				.007	
Sex (male vs. female)	.490	.178	.035		
Age	.006	.087	.005		
Child welfare status (Crown vs. other)	−.228	.191	−.080		
Step 2: Child maltreatment				.035	.029**
Maltreatment	.012	.004	.174**		
Step 3: PTSD Symptoms				.097	.062*
TSCC-Anxiety	−.022	.017	−.160		
TSCC-Depression	−.026	.017	−.191		
TSCC-Anger	−.003	.014	−.020		
TSCC-Post-traumatic Stress	−.016	.018	−.117		
TSCC-Dissociation	.053	.015	.433**		
TSCC-Sexual Concerns	−.004	.006	−.057		

*p<.05; **p<.01

Crown = Crown ward. Maltreatment reflects total score on the CTQ. *TSCC* Trauma Symptom Checklist for Children

protective effect to remaining in the child welfare system as older adolescents enter emerging adulthood. As noted in our previous work (Wekerle, Leung, Goldstein et al. 2009), adolescents currently involved with child welfare may be less likely to consume alcohol due to greater visibility or possible detection of alcohol use by caseworkers. Other drug use (e.g., marijuana) may be perceived as more benign or less easily detected. These

Table 6 Hierarchical regression analysis predicting problem alcohol use from sex, child welfare status, and childhood maltreatment, and PTSD symptoms.

Variable	B	SE	β	R^2	ΔR^2
Step 1: Background variables				.044	
Sex (male vs. female)	.571	.711	.051		
Age	1.038	.346	.196**		
Child welfare status (Crown vs. other)	−1.849	.763	−.160*		
Step 2: Child maltreatment				.056	.012*
Maltreatment	.032	.018	.113		
Step 3: PTSD Symptoms				.128	.072**
TSCC-Anxiety	−.084	.068	−.147		
TSCC-Depression	−.130	.066	−.235		
TSCC-Anger	.141	.055	.230*		
TSCC-Post-traumatic Stress	−.002	.073	−.004		
TSCC-Dissociation	.148	.061	.298*		
TSCC-Sexual Concerns	−.035	.023	−.125		

*p<.05; **p<.01

Crown = Crown ward. Maltreatment reflects total score on the CTQ. *TSCC* Trauma Symptom Checklist for Children

Table 7 Hierarchical regression analysis predicting problem drug use from sex, child welfare status, and childhood maltreatment, and PTSD symptoms

Variable	B	SE	β	R^2	ΔR^2
Step 1: Background variables				.021	
Sex (male vs. female)	.214	.206	.066		
Age	.209	.100	.138*		
Child welfare status (Crown vs. other)	−.284	.221	−.086		
Step 2: Child maltreatment				.048	.027**
Maltreatment	.014	.005	.170**		
Step 3: PTSD Symptoms				.131	.084**
TSCC-Anxiety	−.019	.020	−.113		
TSCC-Depression	−.029	.019	−.180		
TSCC-Anger	.035	.016	.198*		
TSCC-Post-traumatic Stress	−.003	.021	−.022		
TSCC-Dissociation	.054	.018	.377**		
TSCC-Sexual Concerns	−.017	.007	−.206*		

*p<.05; **p<.01.

Crown = Crown ward. Maltreatment reflects total score on the CTQ. *TSCC* Trauma Symptom Checklist for Children

findings suggest a need for greater attention to illicit drug use among older adolescents involved with child welfare and specific strategies for preventing further increases in drug use as they transition into emerging adulthood and out of the child welfare system.

Regarding the specific relationship between substance use and PTSS, the present findings highlight both anger and dissociation as two facets of PTSS that contribute to substance use over and above background variables and maltreatment among older adolescents involved with child welfare. In particular, increased symptoms of anger were associated with increased alcohol and drug problems; increased symptoms of dissociation were associated with greater use of illicit drugs (i.e., use of more types of illicit drugs) and increased alcohol and drug problems. These findings are consistent with others who have identified both anger (e.g., Eftekhari et al. 2004) and dissociative symptoms as predictors of substance use (e.g., Schafer et al. 2010); however, our findings differ in several respects. First, we found that dissociative and anger symptoms predicted illicit drug use and problem alcohol and drug use over and above other well established predictors of substance use, including severity of maltreatment, gender, and age. In their study, Schafer et al. (2010) found that substance use disorder was a significant predictor of dissociative symptoms only when other potential confounding variables (e.g., age and gender) were not included in the model. Second, dissociative and anger symptoms predicted problems even while controlling for other facets of PTSD (e.g., depression, anxiety). Although previous research has identified PTSD and PTSS as important predictors of substance use and substance use disorders among adolescents involved with child welfare (Narendorf and McMillen 2010; Vaughn et al. 2007; Wekerle, Leung, Goldstein, et al. 2009) these studies have considered PTSS as a singular entity, without attending to the heterogeneity with which individuals experience trauma. Specifically, although a diagnosis of PTSD is often characterized by intrusive thoughts, other symptoms (e.g., dissociation, anger) may play an important role and these may be particularly important when considering mechanisms linking child maltreatment (trauma) and substance abuse.

Dissociation in particular may be troubling for individuals in late adolescence and emerging adulthood, a developmental period marked by explorations and conflict in identity. In young children who have been maltreated, dissociation is manifested as a fragmented self that lacks coherence (MacFie et al. 2001). The tasks of adolescence and emerging adulthood may increase the salience of such disruptions in identity, resulting in greater use of maladaptive coping strategies, including substance use and abuse. Alternatively, higher rates of illicit drug use, alcohol and drug problems among those with greater dissociative symptoms may reflect a tendency to use substances to facilitate dissociative experiences (i.e., emotional numbing). Dissociation may serve a protective function in childhood, providing the maltreated child with an escape from an intolerable situation, but may result in increasing difficulties in adolescence and emerging adulthood (e.g., interpersonal difficulties, low distress tolerance). Alcohol and drug use may be an alternative coping strategy when dissociation fails to provide sufficient relief or increases difficulties in other domains.

Anger also emerged as an important predictor of alcohol and drug use and problems. The link between anger and substance use problems may reflect the common finding of overlap between conduct disorder or delinquency and substance abuse. Some of the items on the TSCC Anger subscale overlap with items frequently used to assess conduct problems (e.g., wanting to hurt other people, getting into fights). Previous research has identified conduct disorder as a significant predictor of substance use and substance use disorders among older adolescents involved with child welfare (Narendorf and McMillen 2010). Our findings suggest that outward expressions of anger as well as internalized feelings of anger may increase vulnerability for substance use problems among adolescents involved with child welfare. Previous researchers have identified a significant relationship between child maltreatment (i.e., emotional abuse) and the development of schemas reflecting vulnerability to harm and defectiveness/shame (Wright et al. 2009) and shame has been identified as a mediator of the relationship between child maltreatment (i.e., physical abuse) and anger (Bennett et al. 2005). Thus, angry feelings associated with trauma may reflect feelings of shame associated with a history of child maltreatment or feelings that the world is an unjust place and that other people are dangerous and untrustworthy. Again, substance use may then be a way of coping with feelings of shame and anger.

One additional interesting finding that emerged from this study was a significant negative relationship between sexual concerns and problem drug use. Although there was no bivariate relationship between sexual concerns and substance use, once background variables, maltreatment and the other PTSS subscales were included in the model, sexual concerns emerged as a significant negative predictor. These findings indicate that, in the context of maltreatment, individuals with sexual concerns as a result of their trauma experiences may avoid using substances in an excessive (i.e., problematic) way. Where they are uncomfortable, individuals may avoid substance use because they do not wish to exacerbate current sexual thoughts and feelings. This may be particularly true for avoidance of substances that increase or heighten sexual feelings (e.g., ecstasy, stimulants). Alternatively, youth with histories of maltreatment may be concerned about increased vulnerability to sexual assault due to substance-related disinhibition or cognitive and behavioural impairment.

There are several limitations of this study that should be noted. First, participants were youth currently involved with child welfare. Although these youth are at risk for increased substance use, based on their histories of maltreatment, our sample does not include older youth who are no longer involved with child welfare. The longitudinal nature of the MAP

study is a significant strength, but requires tracking of youth over time. Youth who drop out of the study may be those most at risk, particularly youth who leave child welfare and end up living on the streets. Indeed, a substantial portion of youth who are homeless have a history of child welfare involvement and substance abuse is particularly prevalent among this subset of youth (Goldstein et al. 2010). In the current sample, participants who remained in the study from the initial assessment were more likely to be Crown wards and to have been in the care of child welfare for longer. These youth are likely more engaged with the child welfare system and may have greater access and utilization of child welfare resources, at least while they are still involved with child welfare. Future research should include longitudinal analyses of both older adolescents who remain involved with child welfare and those who exit the system prior to age 18. This is essential for understanding outcomes and determining the extent to which early signs of substance use problems continue into emerging adulthood and beyond. Finally, the analyses included several predictor variables, which may have reduced the power of the analyses, resulting in some nonsignificant effects. In addition, the amount of variance explained by the models was modest (9% to 12%). Additional research with larger samples is needed to identify further psychological mediating mechanisms that explain the relationship between childhood maltreatment and substance abuse in late adolescence and emerging adulthood. For example, substance use motives (i.e., using substances to cope with negative emotions) have been identified as important mediators of this relationship (Goldstein, Flett, and Wekerle 2010). Other possible mediators include feelings of shame associated with maltreatment or difficulties regulating negative emotions.

Despite these limitations, the present findings have important implications especially for older adolescents and emerging adults, many of whom are making the transition out of child welfare. Emerging adulthood is a period of instability and increased risk of substance use even among community samples. For those with maltreatment histories who are experiencing PTSS, including anger and dissociation, substance use may be seen as a way of self-medication or coping. These youth may benefit from exposure to alternative strategies to alleviate symptoms of dissociation and anger, including physical exercise or meditation. Older adolescence and emerging adulthood is a period of transition from a health services perspective as well, with older adolescents and emerging adults caught between a familiar, but no longer appropriate child services system and an unfamiliar adult service system. Recent research has documented a significant decline in utilization of mental health services after youth leave the child welfare system (McMillen and Raghavan 2009). Older adolescents and emerging adults in the care of child welfare require support in navigating the adult mental health system, with caseworkers providing some support initially to help ease the transition from child to adult services and to ensure continuity of care for mental health issues, including PTSS and substance abuse.

Supports within child welfare also need strengthening. Screening for substance use and abuse and early intervention should be part of ongoing assessment of adolescents involved with child welfare. To facilitate these interventions, there is a need for increased resources within child welfare systems to ensure training in substance abuse screening and assessment. In addition, where youth screen positive for substance abuse, there is a need for available youth- and emerging adult-oriented substance abuse treatment agencies to ensure quick referrals and continuity of care ensure quick referrals and continuity of care. Some alternative models should be considered, including the presence of addiction experts within child welfare agencies. In addition, increased collaboration among service sectors (e.g., child welfare, substance abuse treatment, mental health treatment, justice) is needed to better meet the complex needs of adolescents and emerging adults who are

exiting the child welfare system (Wekerle, Leung, Goldstein et al. 2009). Finally, interventions targeting adolescents and emerging adults with maltreatment histories should have an integrated focus, addressing both substance abuse and co-occurring issues stemming from trauma experiences, including dissociation and anger. For example, interventions for substance abuse that target management of intense affect and include strategies for managing dissociation (e.g., grounding) are particularly relevant for youth who have experienced trauma (e.g., Seeking Safety) (Najavits, Gallop, & Weiss, 2006).

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