Published in final edited form as:

Child Abuse Negl. 2018 May ; 79: 269–278. doi:10.1016/j.chiabu.2018.02.023.

Predicting running away in girls who are victims of commercial sexual exploitation

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Abstract

Youth that are victims of commercial sexual exploitation of children (CSEC) have a host of clinical problems and often run away from home, residential care, and treatment, which complicates and limits treatment effectiveness. No research to date has attempted to predict running away in CSEC victims. The present study aimed to 1) characterize a clinically referred sample of girls who were victims of CSEC and compare them to other high-risk girls (i.e., girls who also have a history of trauma and running away, but deny CSEC); and 2) examine the utility of using the Youth Level of Service/Case Management Inventory (YLS/CMI) to predict future running away. Data were collected from de-identified charts of 80 girls (mean age=15.38, SD=1.3, 37.9% White, 52.5% CSEC victims) who were referred for psychological assessment by the Department of Child Services. Girls in the CSEC group were more likely to have experienced sexual abuse (χ^2=6.85, p=.009), an STI (χ^2=6.45, p=.01), a post-traumatic stress disorder diagnosis (χ^2=11.84, p=.001), and a substance use disorder diagnosis (χ^2=11.32, p=.001) than high-risk girls. Moderated regression results indicated that YLS/CMI scores significantly predicted future running away among the CSEC group (β=0.23, SE=.06, p=.02), but not the high-risk group (β=−.008, SE=.11, p =.90). The YLS/CMI shows initial promise for predicting future running away in girls who are CSEC victims. Predicting running away can help identify those at risk for and prevent running away and improve treatment outcomes. We hope current findings stimulate future work in this area.

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Conflict of interest: None. The NIAAA had no role in the study design, collect, analysis or interpretation of data, the writing of the report, or decision to submit the report for publication.

Keywords

commercial sexual exploitation of children; girls; CSEC; running away; Youth Level of Service/ Case Management Inventory

Introduction

The commercial sexual exploitation of children (CSEC) in the United States has been increasingly recognized as a serious public health concern (National Research Council, 2013). CSEC is defined by the United Nations Convention on the Rights of the Child (UN CRC) as "the use of a child (every human being below the age of 18 years) in sexual activities for remuneration or any other form of consideration" (United Nations General Assembly, 2000b, Article 2). It is difficult to measure and assess the extent and prevalence of CSEC likely due to under reporting and other methodological challenges. As highlighted by Finkelhor and colleagues (2017), many estimates of CSEC prevalence are based on extrapolated data, with annual prevalence estimates ranging from 1,450 (Mitchell et al., 2010) to 200,000 (Estes et al., 2001).

What research does indicate is that that victims of CSEC, as compared to other high-risk groups (e.g. victims of childhood sexual abuse), present with a greater likelihood of multiple clinical problems, and thus have vast treatment needs. For example, CSEC victims are more likely to present with post-traumatic stress disorder (PTSD; Hossain et al., 2010; Cole et al., 2016), substance use disorders (SUD; Hossain et al., 2010; Varma et al., 2015; Cole et al., 2016; Greenbaum et al., 2018), and a history of STI (Varma et al., 2015; Greenbaum et al., 2018), than other high-risk groups. Additionally, CSEC victims are more likely to engage in delinquent behaviors (Cole et al., 2016), including having a history of being violent with others and a history of being involved with the police (Greenbaum et al., 2018), than other high-risk groups. Most relevant to the present study, CSEC victims present with a chronic history of running away from home, residential care, and treatment (Choi, 2015; Cole et al., 2016; Greenbaum et al., 2018). After running away, victims are likely to re-experience CSEC (Choi, 2015; Greenbaum et al., 2018; Cole et al., 2016; Greenbaum et al., 2018). These high rates of running away make it extremely difficult to effectively treat CSEC victims and to mitigate future risk of CSEC.

There is limited research to date examining *why* CSEC victims may be more prone to running away than other high-risk youth (e.g. victims of childhood sexual abuse; Cole et al., 2016). Cole and colleagues (2016) theorize that CSEC victims develop a distrust of adults, driven by symptoms of PTSD, and this distrust is capitalized upon by exploiters, leading CSEC victims to become further isolated and alienated from others, and ultimately, leaving victims at risk for running away. Longitudinal research indicates that running away in adolescence predicts many negative outcomes later in life (Tucker et al., 2011), such as future drug dependence and depressive symptoms at age 21 (Tucker et al., 2017), homelessness at age 25 (Brakenhoff et al., 2015), and suicidal behavior in adulthood (Meltzer et al., 2012). CSEC victims face unique risks, as they often have an elaborate street network of others that have been sexually exploited or may still be in contact with their

exploiter (Fedina, Williamson, & Perdue, 2016), which likely places them at risk for further exploitation following running away (Choi, 2015; Greenbaum et al., 2018; Cole et al., 2016). Thus, it is important to minimize runaway risk for CSEC victims in order to improve outcomes for this group.

In order to reduce runaway risk, there is first a need to develop a valid and reliable measure for predicting future running away. Research in high-risk adolescent samples, including adolescents in residential treatment (McIntosh et al., 2010) and adolescents enrolled in a randomized clinical trial for a parent-child mediation program (Brooks et al., 2017), indicate that risk factors for running away include poor school attendance, history of running away, older age, substance use, delinquency (McIntosh et al., 2010; Brooks et al., 2017), and poor family functioning (Brooks et al., 2017). However, there is no research that establishes predictors of running away in CSEC victims. Measures of risks and needs related to delinquent behaviors (e.g. substance use, school attendance, family functioning, peer influences) could, as in other populations of high-risk youth (McIntosh et al., 2010; Brooks et al., 2017), be an indicator of likelihood of running away in CSEC victims. One commonly used measure of delinquency is the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002; Hoge & Andrew, 2011). The YLS/CMI is a clinician-rated instrument often used in the juvenile justice system to evaluate risk and needs of adolescents aged 12–18 based on multiple delinquency-related factors. Research indicates that the YLS/CMI total score is a valid means of predicting recidivism (e.g. Olver et al., 2012; Anderson et al., 2016). There is no research to date examining the ability of the YLS/CMI to specifically predict running away, but given its content, ease of administration, frequent usage in clinical settings, and usefulness in predicting recidivism, the YLS/CMI is a prime candidate for predicting running away.

The present study aimed to replicate and extend findings in the current CSEC literature through two aims, using data collected from charts of girls who were referred for a psychological assessment by the Department of Child Services due to a history of running away and trauma. Girls were assessed and then followed clinically by an agency that specializes in treating girls who are victims of CSEC and trauma. First, we aimed to replicate prior research by comparing girls in this sample who were victims of CSEC (which we call the “CSEC” group) to girls in the sample who did not have a history of CSEC (which we call the “high-risk” group) across a number of clinical indicators. Second, we aimed to extend the CSEC literature by examining the utility of using the YLS/CMI to predict future running away in these girls. It is important to note that, although boys are undoubtedly victimized in the form of CSEC and likely have unique health care and social support needs (Mitchell et al., 2017), the focus of the present manuscript is on girls who are victims of CSEC.

Methods

Participants

Following Institutional Review Board approval, data were collected from de-identified psychological assessment records of girls who were referred for psychological assessment by the Department of Child Services in a large Midwestern city. The psychological

assessments were conducted by an agency that specializes in treating girls who are victims of CSEC and trauma. Referrals were made to the agency with the goal of determining the extent of trauma experienced by the victim, including CSEC, and referrals requested recommendations for placement (e.g. residential treatment, group home, parent or relative care) and course of treatment, based on the trauma assessment findings. Referral criteria for psychological assessment with this agency were 1) history of running away (i.e. at least one instance of running away from home or residential placement) and 2) history of multiple traumas. Prior to psychological assessment, girls were informed that the assessment would be used to aid in making treatment recommendations to the Department of Child Services and they and their guardian provided assent/consent. No girls or guardians refused consent.

Materials

Demographics and relevant characteristics—Girls provided demographic information to their assessor, including their age and race. Through a structured biopsychosocial assessment, girls provided the following information to the assessor, which was recorded in the assessment report: sexual orientation, age of first consensual vaginal intercourse, age of first substance use, number of types of substances used in the past year (substances assessed included alcohol, cannabis, heroin, cocaine, crack, hallucinogens, amphetamines, inhalants, synthetic marijuana, and abuse of prescription or over-the-counter medication), STI history (yes or no and number of times contracting an STI), history of childhood sexual abuse (yes or no), history of witnessing domestic violence (yes or no), history of being a victim of domestic violence (yes or no), abandonment by mother or father (yes or no), experiencing a significant death (yes or no), being shot at or witnessing gun violence (yes or no), seeing a dead body in real life other than at a funeral (yes or no), and number of times running away prior to assessment.

Running away—Running away was defined as the girl leaving her placement (e.g. residential treatment facility, home, foster home) without permission and not returning for at least a 24-hour period. We assessed running away that occurred following assessment for the purpose of the current study. Reports of the girl eloping were either received through a court-appointed team (e.g. DCS case worker, probation) or directly reported from a guardian or residential treatment staff, and then recorded in the agency's database by an agency clinician. Database records regarding running away following the assessment were coded as either 0-did not run away or 1-ran away. Clinicians also recorded the number of days from the assessment report to the day of running away (average time to running away=97.85 days, SD=58.10).

YLS/CMI—The Youth Level of Service Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002; Hoge & Andrews, 2011) is a clinician-rated instrument often used in the juvenile justice system to evaluate risk and needs of adolescents aged 12–18 based on multiple delinquency related factors. The YLS/CMI is rated by the clinician based on structured clinical interview on eight domains: prior and current offenses (5 items; e.g. prior convictions or custody), family circumstances/parenting (7 items; e.g. difficulty controlling adolescents' behavior), education/employment (7 items; e.g. disruptive classroom behavior), peer relations (4 items; e.g. no/few positive friends or acquaintances), substance abuse (5

items; e.g. substance abuse linked to offenses), leisure/recreation (3 items; e.g. limited organized activities), personality/behaviors (7 items; e.g. inflated self-esteem), and attitudes/orientations (5 items; e.g. antisocial or pro-criminal attitudes). Each domain was scored by the clinician (e.g. trained clinician and/or psychologist) by summing the total items endorsed within the domain, with domain scores corresponding to four possible categories: strength, low risk, moderate risk, and high risk (scores required for each category vary by domain). Additionally, a total score was computed for the YLS/CMI, with scores including low risk (0–8), moderate risk (9–22), and high risk (23–42). The YLS/CMI has been shown to discriminate re-offending by low, medium, and high scores (e.g. Cathpole & Gretton, 2003; Onifade et al., 2008) and is predictive of recidivism and treatment success (Vierira, Skilling, & Peterson-Badali, 2009; Olver, Stockdale, & Wormith, 2011; Schmidt, Campbell, & Houlding, 2011), although some research suggests this effect is stronger for boys than girls (Anderson et al., 2016). Further, the YLS/CMI has be validated for use in adolescents referred for psychological assessments (Schmidt et al., 2011) and in psychological rehabilitation settings (Flores, Travis, & Latessa, 2003) and overall, demonstrates good internal consistency and inter-rater reliability (Schmidt et al., 2005). The reliability of the overall scale in the present sample was acceptable (Cronbach's alpha=0.71).

Diagnoses—Diagnoses were determined by the trained clinician at the time of the assessment based on the Diagnostic and Statistical Manual, 5th Edition (DSM-5; American Psychiatric Association, 2013), approved by a licensed clinical psychologist, and recorded in the assessment reports.

CSEC versus high-risk group—The present study dichotomized girls into either the *CSEC* or *high-risk* group. Girls were classified as CSEC if either they specifically self-reported a history of CSEC, clinicians determined the girl had experiences which fit the definition of CSEC (for example, many CSEC victims do not view themselves as having been exploited and thus do not endorse being a victim of CSEC, making it necessary for clinicians to make a determination based on the definition of CSEC) or had court documentation (e.g. probation report, police report) of CSEC. Girls in the high-risk group denied CSEC or any activity falling under the definition of CSEC, as judged by the clinician, and had no court documentation indicating evidence of involvement in CSEC.

Procedure

Assessments were conducted between 2014 and 2017 by clinicians at an agency specializing in the assessment and treatment of girls who are victims of CSEC and trauma. The agency was contracted by the Department of Child Services to complete the psychological assessments, with a licensed clinical psychologist or licensed clinical social workers under the supervision of the psychologist. All clinicians received training in assessing for CSEC and were trained in scoring the YLS/CMI. The majority of the assessments were conducted in residential treatment settings (92.6%), with the remaining being conducted in the girls' community placement (e.g. guardian's home; 3.7%), and the juvenile detention center (1.2%). Assessment setting was not given for N=2 (i.e. 2.5%). Following the assessment, girls' cases remained active with the agency and reports of the girl running away were either received through a court-appointed team (e.g. DCS case worker, probation) or directly

reported from a guardian or residential treatment staff, and then recorded in the agencies database.

Following Institutional Review Board approval, a clinician at the agency de-identified all assessments. Two trained research assistants not affiliated with the agency then coded each de-identified assessment for the measures listed above (i.e., research assistants did not make, for example, any diagnoses or produce scores for the YLS/CMI, but rather took this information directly from the report). Approximately 15% of assessments were coded by both research assistants (inter-rater reliability kappa=0.64).

Data analysis plan

First, descriptive statistics and other relevant characteristics (e.g. self-harm, DSM diagnoses) were examined for N=80 girls separately across CSEC and high-risk groups, using independent samples *t*-tests and chi-square tests of independence to assess group differences (Aim 1). Second, data were retained only for those girls who had clinician-rated YLS/CMI scores (N=66) recorded in their psychological assessment report (i.e., research assistants did not score the YLS/CMI). Reasons for missing YLS/CMI scores were not reported. Correlations were then examined between the YLS/CMI and relevant characteristics for the total sample, and a hierarchical logistic regression was conducted to examine the relationship between YLS/CMI and subsequent running away following assessment, controlling for age. A moderated regression, controlling for age, was conducted using Andrew Hayes' PROCESS macro (Hayes, 2013) to examine the relationship between YLS/CMI total score and subsequent running following assessment as moderated by group (i.e., CSEC vs. high-risk group) (Aim 2). Last, classification statistics (sensitivity, specificity, false negative, false positive) were calculated to examine potential cut scores for using the YLS/CMI to predict running away for CSEC victims.

Results

Descriptive statistics

Tables 1 and 2 present descriptive statistics for the total sample (N=80; mean age=15.38, SD=1.3, 37.9% White, 39.4% Black). The majority of the sample reported a history of domestic violence (N=48), sexual abuse (N=63), experiencing more than three types of trauma (N=60), and at least two prior instances of running away from home or placement (N=76). The average age of substance use onset for the total sample was 11.92 years (SD=3.1), with many reporting the use of more than one substance within the last year (N=38). Of the total sample, N=55 girls were diagnosed with PTSD, N=51 girls were diagnosed with any substance use disorder, and N=36 girls were diagnosed with a depressive disorder.

Differences across CSEC and high-risk groups (N=80)

Tables 1 and 2 present descriptive statistics across girls who are CSEC victims (N=42) and those that are high-risk (N=38). Compared to high-risk girls, girls who are victims of CSEC were more likely to report a history of sexual abuse (χ^2 (2, N=80)=6.85, p=.009), have contracted an STI (χ^2(2, N=57)=6.45, p=.01), report earlier age of onset of substance use

(t(79)=−2.02, p=.03), and report using at least three substances within the past year (χ^2(2, N=80)=11.06, p=.001). Compared to high-risk girls, those that are victims of CSEC were more likely to have been diagnosed with PTSD (χ^2(2, N=80)=8.38, p=.004) and any substance use disorder (χ^2(2, N=80)=12.07, p=.001), including an alcohol use disorder (χ^2(2, N=80)=5.90, p=.02), and cannabis use disorder (χ^2(2, N=80)=10.10, p=.001). On the YLS/CMI, girls who were victims of CSEC were more likely than high risk girls to score in the "high risk" range on peer relations (χ^2(2, N=66)=5.65, p=.02), and substance use (χ^2(2, N=66)=4.11, p=.04).

Differences across CSEC and high-risk groups on the YLS/CMI (N=66)

Those girls without clinician-rated YLS/CMI scores (N=16) did not significantly differ from those with YLS/CMI scores (N=66) in age (t(78)=−0.40, p=.69), race (χ^2 (5, N=66)=9.54, p=.15), reporting CSEC (χ^2(2, N=80)=0.63, p=.43), running away following the assessment (χ^2 (2, N=80)=1.04, p=.31), PTSD diagnosis (χ^2(2, N=80)=0.06, p=.81), total types of trauma experienced (t(76)=−0.51, p=.61), or number of times of running away in the past (t(77)=0.01, p=.99). YLS/CMI scores were approximately normally distributed, with an average total score of 21.64 (SD=6.4). YLS/CMI scores were significantly correlated with diagnoses of a substance use disorder (SUD) (r(64)=0.41, p<.001) and conduct disorder (r(64)=0.53, p<.001; see Table 3).

For YLS/CMI individual items, girls that were victims of CSEC were more likely than high risk girls to score in the "high risk" range on peer relations (χ^2=6.10, p=.01), substance use (χ^2=4.26, p=.04), leisure/recreation (χ^2=3.87, p=.05), and less likely to score high on personality/behaviors (χ^2=4.26, p=.05).

Likelihood of running away

Hierarchical logistic regression was conducted to examine the relationship between the YLS/CMI total score and running away that occurred following assessment for the total sample, controlling for age. Results indicated that YLS/CMI total score was not significantly related to running away (χ^2(2, N=66)=2.42, OR=1.08, 95% CI 0.98 to 1.19, p=.14).

Moderated logistic regression was conducted to examine if the relationship between the YLS/CMI total score and running away that occurred following assessment is moderated by CSEC (1) versus high-risk (0) group, controlling for age. Results indicated that age (β= −0.04, p=.89), CSEC versus high-risk group (β=−4.92, p=.09), and YLS/CMI total score (β=−0.008, p=.89) were not significantly related to running away. The relationship between the YLS/CMI total score and running away was significantly moderated by CSEC versus high-risk group (β=0.24, SE=0.12, p=.05; see Figure 1). The interaction was probed using PROCESS and findings indicated that the relationship between the YLS/CMI total score and running away was significant and positive for girls belonging to the CSEC group (β=0.23, SE=.06, p=.02), but that the relationship was not significant for those in the high-risk group (β=−0.008, SE=.11, p=.90). Follow-up t-tests indicated that, in the CSEC group, girls who ran away following assessment scored significantly higher on the YLS/CMI (mean=25.3, SD=3.97) than those that did not run away following assessment (mean=20.69, SD=5.14, t(34)= −2.55, p=.02). In the high-risk group, there was no significant difference in YLS/CMI

scores for those that ran away following assessment (mean=20.8, SD=7.79) and those that did not run away following assessment (mean=21.28, SD=7.79; $t(28)=0.13$, $p=.90$).

Classification Statistics

Classification statistics (sensitivity, specificity, false negative, false positive) were computed for the CSEC group using a 2x2 table of predicted and actual running away following assessment based on a range of individual YLS/CMI cut scores (15–25). Table 4 presents YLS/CMI cut scores and corresponding classification statistics, including number of girls by classification statistic for each cut score.

Discussion

Although CSEC is a growing public health concern in the United States (Estes et al., 2001), limited research has examined victims of CSEC. Present findings replicate previous research (Hossain et al., 2010; Varma et al., 2015; Cole et al., 2016; Greenbaum et al., 2018) and indicate that clinically referred girls who are victims of CSEC were more likely than other high-risk girls to have a history of childhood sexual abuse (even after excluding CSEC victimization), contracted an STI, used multiple substances of abuse, and a DSM diagnosis of PTSD, SUD, alcohol use disorder, and cannabis use disorder. Further, the present study extended previous research by finding that the YLS/CMI is a novel and viable predictor of running away in girls who are victims of CSEC. Running away is a problem extremely common to CSEC victims (e.g. Greenbaum et al., 2018) that complicates treatment and increases risk for a wide range of negative outcomes, including re-victimization (e.g. Brooks et al., 2017); thus, predicting running away is a key means to begin to prevent running away and improve clinical outcomes. Additionally, we explored potential cut scores for the YLS/CMI that would maximize the prediction of running away and minimize false-positives and false-negatives, as these incorrect classifications have unique risks for this group.

Present findings replicate and extend findings from other studies of victims of sexual exploitation, indicating that girls who are victims of CSEC are more likely to have had a history of childhood sexual abuse and STIs, and to present with symptoms of PTSD and substance use disorders (e.g. Varma et al., 2015; Cole et al., 2016; Greenbaum et al., 2018). The present study added to this literature by examining DSM diagnoses, and further, compared the CSEC victims to other girls with a significant history of running away and trauma. Interestingly, there were no group differences on the measure of delinquency (YLS/CMI), with the majority of scores for both groups falling in the range of high delinquency. This means that these groups were fairly well matched on delinquency, such that risk differences cannot be attributed to delinquency confounds. Importantly, increased risks identified here existed even after comparing to other high-risk girls with chronic trauma and history of running away but who do not report CSEC. To observe differences on these factors in girls who all present with high base-rates of multiple problems and psychological disorders strengthens our confidence that childhood sexual abuse, PTSD, and substance use are important risk indicators or potential points for intervention in CSEC victims.

It should be noted that because the data collected for aim 1 of this study were cross-sectional, we cannot ascertain which came first, CSEC or these other risk indicators.

Specifically, childhood sexual abuse, substance use and PTSD could 1) precede CSEC, 2) follow CSEC, or 3) both precede and follow CSEC (including during the period of CSEC). First, it is viable that childhood sexual abuse, PTSD, and substance use could precede CSEC. These factors could make girls vulnerable to victimization in the form of CSEC (Brown et al., 2015). We believe it is important to distinguish that, given the vulnerability of this population to be blamed for their exploitation, childhood sexual abuse, PTSD, and substance use are likely important risk indicators for exploitation that can be targeted in prevention and treatment, but should not be indicators used to reduce the criminality of perpetrators of CSEC. Second, it is also plausible that childhood sexual abuse, PTSD, and substance use follow CSEC. For example, victims of CSEC who experienced sexual violence present with higher rates of PTSD (Hossain et al., 2010), which presumably followed sexual exploitation; similarly, substance use could be one means of coping with these symptoms of PTSD (Reid & Piquero, 2014), in line with the self-medication hypothesis of substance use (e.g. Wolitzky-Taylor et al., 2012). Third, CSEC and childhood sexual abuse, PTSD, and substance use could be related in a multi-directional path between these factors. For example, childhood sexual abuse may occur prior to and following CSEC (Saewyc, Drozda, Rivers, MacKay, & Peled, 2013), which may then lead to the development of PTSD, or PTSD related symptoms (e.g. avoidance, emotion dysregulation). Through PTSD or related symptoms, childhood sexual abuse indirectly leads to problems, including running away from home or treatment, and the development of substance use disorders (Sanders et al., in press), with such factors potentially contributing to further PTSD symptomology and vulnerability to further CSEC or childhood sexual abuse. Next, running away and SUD may serve as risk factors for CSEC (e.g. due to greater need of goods often promised by perpetrators of CSEC, for example; Reid & Piquero, 2014). CSEC may be related to further substance use (e.g. as a result of addiction) and running away (e.g. desire to use substances). Then, CSEC is directly related to the development or perpetuation of PTSD and related symptoms (Hossain et al., 2010), and the cycle continues if there is not successful intervention. Together, considerable research is needed to better understand the developmental trajectory of childhood sexual abuse, PTSD, and substance use in victims of CSEC.

Present findings add to the evidence that victims of CSEC have vast psychological needs, but keeping this population engaged in treatment and preventing running away is a challenge that contributes to poor treatment outcomes and makes it difficult to develop and test treatment efficacy and effectiveness. The current study proposed that the YLS/CMI, a commonly used measure of delinquency, has promise as a measure of future run-away risk in girls who are CSEC victims. We hope utilizing forms, such as the YLS/CMI, can help reduce run-away-related challenges and we believe this measure should be utilized in risk-assessment in this population. The YLS/CMI can be used as one piece of information predicting run-away risk until more robust explorations of cut-scores are developed. Prediction of run-away risk is a key step to then targeting those at risk for running away in order to prevent running away and improve clinical outcomes. Significant research is needed to further explore potential cut scores for the YLS/CMI in classifying probability of running away, but present findings can aid in guiding clinicians in run-away risk assessment.

One compelling and debatable issue related to assessing run-away risk using the YLS/CMI is which classification statistic should be given the most consideration in deciding risk of running away. If the overarching goal of the clinician is to properly predict each girl that will run away (i.e., sensitivity), our findings suggest a cut score of 20 accomplishes this goal. Using this score to indicate a high probability of running away would also be most prudent for research which suffers from high run-away rates, and clinicians could take steps to keep those girls which scored a 20 or higher on the YLS/CMI engaged in treatment and to prevent their running away (e.g. restricting outing privileges). At the same time, the false positive rate (i.e. number of girls classified as running away who did not actually run away) at a cut-score of 20 is 69.2%, which is high. Although there is limited research to date in girls who are victims of CSEC, placing unnecessary restrictions on a large proportion of girls because they were misclassified as having a high probability of running away could be detrimental. For example, this could result in girls being unfoundedly denied privileges to interact in the community while in residential care, which would accordingly slow their ability to progress through any treatment program and undoubtedly foster a sense of unfairness, which could have a multitude of treatment repercussions (distrust, lack of engagement). For both research and treatment purposes, we take the stance that there is value in selecting a cut-score that balances both sensitivity and false positive rates, maximizing capturing those girls who will run away and minimizing improperly capturing those girls who will not run away.

Based on the present findings, a cut score of 23 does provide a balance, with a sensitivity rate of 80% and false positive rate of 38.5%. However, we believe that a false-positive rate of 38.5% is still high and could lead to placing improper restrictions on CSEC victims in treatment. Therefore, although based on the current data a cut-score of 23 seems to provide the best balance between sensitivity and false positive rates, considerable research is needed to improve run-away prediction in victims of CSEC using the YLS/CMI. Although the YLS/CMI should serve as an aid to clinicians to assess run-away risk in this population, the psychometric properties found in this sample do not provide sufficient false-positive rates to say with strong confidence that the YLS/CMI is a good predictor of running away in victims of CSEC. Findings do indicate, however, that this scale differentially predicts running away between girls who are CSEC victims and other high risk girls. Future studies should aim to improve the precision of predicting run-away risk, including using a larger sample to evaluate the YLS/CMI. Additionally, researchers should further examine the psychometric properties of the scale, such as assessing each YLS/CMI domain’s ability to predict running away and moderating factors which could be increasing false negative rates, such as protective factors.

Although the present study was novel, in that it shows the YLS/CMI is related to likelihood of running away in girls who are victims of CSEC, there are some limitations to discuss. First, as in many studies, the present study is limited in its cross-sectional design and small sample size. It is possible there were important differences between the CSEC and high-risk group that we could not detect due to a limited sample, but this also increases our confidence in significant differences that were detected. Additionally, YLS/CMI scores were available for N=66 girls, further limiting the sample size, although we did not detect significant differences between those girls with and without YLS/CMI scores on relevant characteristics, thus we do not believe this limitation impacted observed differences on this

measure. Due to the nature of the assessments coded, we were unable to examine or control for factors such as time in treatment, and future studies should determine if there is differential risk predicted by the YLS/CMI by, for example, time in treatment. Additionally, we do not have information on those girls who ran away following the last assessment coded, thus there may be some girls who did run away after we coded and analyzed data, and this was not captured in our results. Also important, it is possible that some girls in the high-risk group were victims of CSEC and did not report this at the time of assessment, although unlikely that girls in the CSEC group belonged to the high-risk group, and there are multiple reasons why girls may have not reported experiences of CSEC, including stigma, fear of punishment (e.g. criminalized as a prostitute), or fear of their exploiter. The present findings are specific to high-risk girls who present with run-away history and extensive trauma history, although given group differences were still detected in such a high-risk sample, CSEC specific factors found in the present study (e.g. PTSD, substance use, sexual abuse, STIs) could be strong red flags for CSEC in many populations of girls. Additionally, the present sample was largely comprised of White and Black girls who identified as heterosexual, and there could be important risk differences based on race or sexual orientation. It is also important to note that the present sample was comprised of all girls, whereas research indicates high rates of boys are being victimized in the form of CSEC (Mitchell et al., 2017). As highlighted by Mitchell et al. (2017), there is a great need for research on boys that are victims of CSEC, but present findings cannot be assumed to generalize to this population. Lastly, our findings do not indicate whether or not predicting running away aids in reducing running away, which we believe is a critical step in future research; however, understanding who is at increased risk for running away will help to target prevention strategies to those at risk for running away in order to prevent such running away and improve clinical outcomes.

In conclusion, significant research is needed to better understand the needs and risks of girls who are victims of CSEC. Our study replicated and extended previous work highlighting the vast risks associated with girls who are CSEC victims. Our study is the first to suggest that the YLS/CMI may be a viable predictor of runaway risk specific to CSEC victims; predicting running away is important in order to target prevention strategies used to minimize running away and the subsequent risks associated with it, including substance use, homelessness, and re-victimization. We hope the current findings stimulate future work in this area. Significant research is needed to better understand how and why CSEC victims are at higher risk for a wide range of clinical problems, to examine which YLS/CMI cut scores are best indicative of running away, how precision of the YLS/CMI can be improved in predicting running away, and to determine how best to minimize running away in CSEC victims.

Acknowledgments

The preparation of this manuscript was funded in part by an F31 grant awarded by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) to Alexandra Hershberger (F31 AA024682) under the mentorship of Melissa A. Cyders. The authors would like to acknowledge Ascent 121 for the administration and collection of assessments used in the present study.

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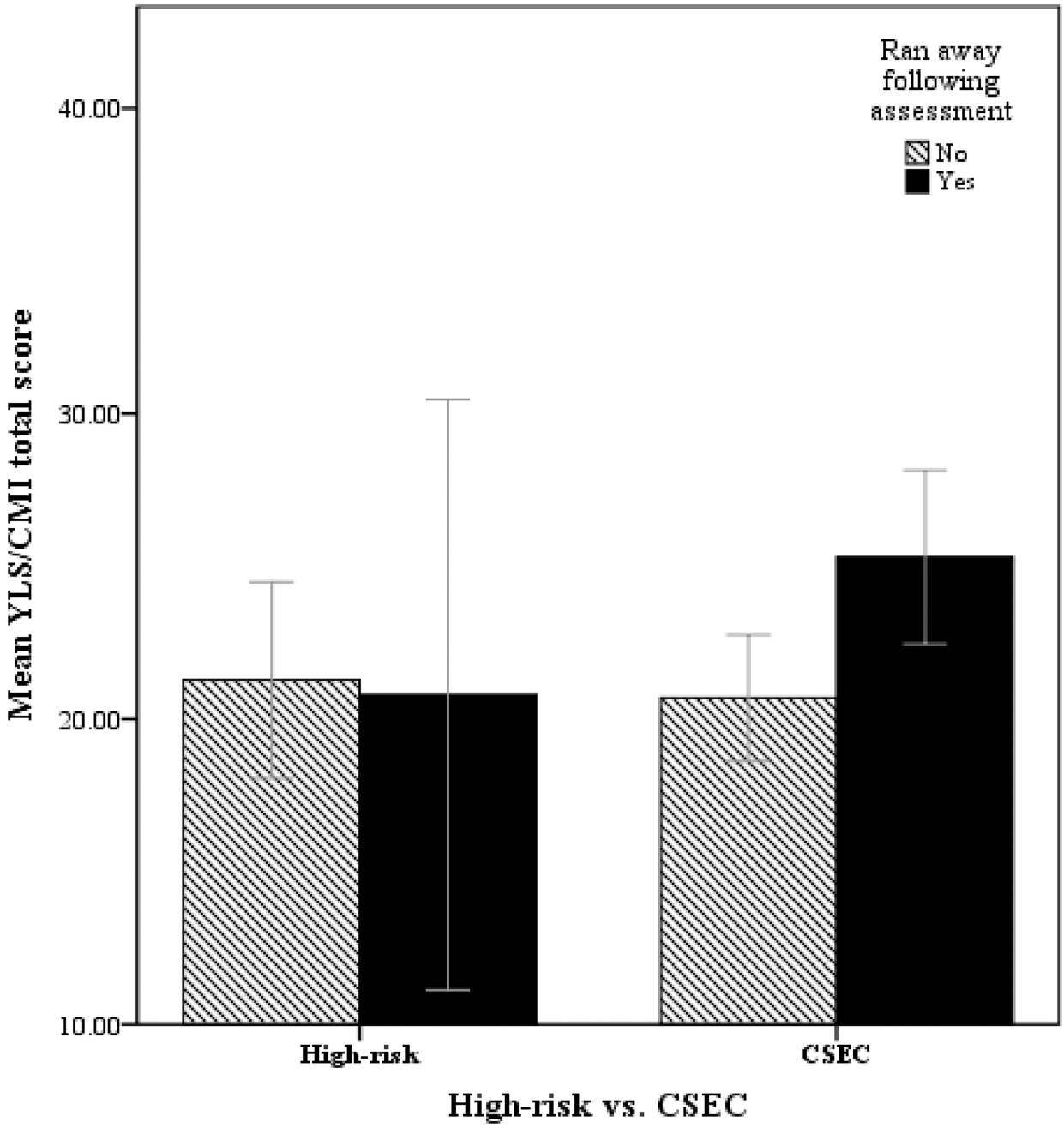

Figure 1.

YLS/CMI scores by running away following assessment for the CSEC and high-risk group. The relationship between the YLS/CMI total score and running away was significantly moderated by CSEC versus high risk group ($\beta = 0.24$, SE = 0.12, $p = 0.05$). Follow-up t-test indicated that, in the CSEC group, girls that ran away following assessment scored significantly higher on the YLS/CMI (mean=25.3, SD=3.97) than girls that did not run away (mean=20.69, SD=5.14). In the high-risk group, there was no significant difference in

YLS/CMI scores for girls that ran away (mean=20.8, SD=7.79) and girls that did not run away (mean=21.28, SD=7.79; $t(28)=0.13$, $p=.90$). * $t(34)=-2.55$, $p=.02$

Table 1

Descriptive statistics for the total sample and across CSEC and high-risk groups

	Total sample (N=80)	**CSEC (N=42)**	**High-risk (N=38)**	**Test-stat**	**p-value**
Age Mean (SD)	15.38 (1.3)	15.67 (0.86)	14.97 (1.47)	−1.81	.07
White N (%)	25 (37.9)	13 (38.2)	12 (37.5)	.004	.95
Black	26 (39.4)	13 (38.2)	13 (40.6)	.04	.84
Hispanic	6 (9.1)	3 (8.8)	3 (9.4)	.006	.94
Asian/Pacific Islander	4 (6.1)	2 (5.9)	2 (6.3)	.004	.95
Other	5 (7.6)	3 (8.8)	2 (6.3)	.16	.69
Heterosexual	43 (65.2)	23 (65.7)	20 (64.5)	.01	.92
Bisexual	19 (28.8)	10 (28.6)	9 (29.0)	.002	.97
Other (e.g. pansexual)	3 (4.5)	1 (2.9)	2 (6.5)	.49	.48
Ran away following assessment N (%)	20 (24.7)	11 (26.2)	9 (23.7)	.07	.80
≥ 2 instances of running away ever N (%)	76 (95)	39 (92.9)	36 (94.7)	.12	.73
Domestic Violence N (%)	48 (59.3)	24 (57.1)	23 (60.5)	.09	.76
Sexual Abuse N (%) *	63 (77.8)	37 (88.1)	24 (63.2)	6.85	**.009**
Witnessed domestic violence N (%)	33 (40.7)	19 (45.2)	14 (36.8)	.58	.45
Abandonment by Parent N (%)	45 (55.6)	24 (57.14)	21 (55.3)	.03	.87
Significant Death N (%)	45 (55.6)	24 (57.14)	20 (52.6)	.16	.67
Gun violence N (%)	15 (18.5)	9 (21.4)	6 (15.8)	.42	.52
Seen a dead body N (%)	5 (6.2)	3 (7.1)	2 (5.2)	.12	.73
≥ 3 trauma types N (%) *	60 (75.9)	34 (81)	25 (65.8)	2.37	.12
Self-harm N (%)	44 (69.8)	24 (70.6)	20 (68.9)	.02	.89
Age of first intercourse Mean (SD)	12.55 (3.25)	12.69 (2.53)	12.38 (4.01)	−0.39	.70
STI N (%)	30 (37)	22 (64.7)	7 (30.4)	6.45	**.01**
> 1 STI N (%)	8 (9.9)	6 (17.6)	2 (8.7)	.91	.34
Age of first drug use Mean (SD)	11.92 (3.1)	12.61 (2.31)	11.03 (3.66)	−2.20	**.03**
≥ 2 types of substances N (%)	38 (46.9)	24 (57.1)	14 (36.8)	3.30	.06
≥ 3 types of substances N (%)	17 (21)	15 (35.7)	2 (5.3)	11.06	**.001**

Note. Bolded values indicate significant p-values at $p<.05$. Race reported for n=34 CSEC and n=32 High-risk; Sexual orientation reported for n=35 CSEC and n=31 High-risk. Self-harm reported for n=34 CSEC and n=29 High-risk. STI reported for n=34 CSEC and n=23 High-risk.

* Excludes sexual exploitation as trauma; no group difference for N running away or N trauma up to the max recorded (8) instance of running away or types of trauma (7)

Table 2

DSM Diagnoses and YLS/CMI scores for the total sample and across CSEC and high-risk group

	Total sample (N=80)	CSEC (N=42)	High-risk (N=38)	Test-stat	p-value
DSM Diagnosis N (%)					
Post-traumatic Stress Disorder	55 (68.8)	36 (85.7)	19 (50)	11.84	**.001**
Substance Use Disorder	51 (63.8)	34 (81)	17 (44.7)	11.32	**.001**
Conduct Disorder	26 (32.5)	15 (35.7)	11 (28.9)	.42	.52
Depressive Disorder	36 (45)	19 (45.2)	17 (44.7)	.002	.96
Alcohol Use Disorder	16 (20)	13 (31)	3 (7.9)	6.63	**.01**
Opioid Use Disorder	7 (8.8)	5 (11.9)	2 (5.3)	1.10	.29
Stimulant Use Disorder	8 (10)	7 (16.7)	1 (2.6)	4.37	**.04**
Cannabis Use Disorder	50 (62.5)	33 (78.6)	17 (44.7)	9.74	**.002**
YLS/CMI					
Total score mean (SD)	21.64 (6.4)	21.97 (5.23)	21.20 (7.66)	−0.49	.63
High Prior and Current Offenses N (%)	21 (29.6)	12 (32.4)	9 (26.5)	0.30	.58
High Family Circumstances N (%)	54 (76.1)	28 (75.7)	26 (76.5)	.006	.94
High Education/Employment N (%)	32 (45.1)	14 (37.8)	18 (52.9)	1.63	.24
High Peer Relations N (%)	41 (57.8)	26 (70.3)	14 (41.2)	6.10	**.01**
High Substance Abuse N (%)	32 (45.1)	21 (56.8)	11 (32.3)	4.26	**.04**
High Leisure/Recreation N (%)	57 (80.2)	33 (89.2)	24 (70.6)	3.87	**.05**
High Personality/Behaviors N (%)	14 (19.7)	4 (10.8)	10 (29.4)	3.87	**.05**
High Attitudes/Orientations N (%)	6 (8.5)	3 (8.1)	3 (8.8)	.01	.91

Note. Bolded values indicate significant p-values at $p<.05$; YLS/CMI N=66 (CSEC N=36; high risk N=30)

Table 3

Correlations between YLS/CMI and other study variables

Variable	2.	3.	4.	5.	6.
1. YLS/CMI	0.16	0.41**	0.53**	−0.18	0.18
2. Post-traumatic Stress Disorder		0.32*	0.04	−0.08	0.32*
3. Substance Use Disorder			0.20	−0.11	0.01
4. Conduct Disorder				−0.26*	−0.04
5. Depressive Disorder					0.06
6. Ran away following assessment					

Note.

* $p<.01$,

** $p<.001$

Table 4

Classifications statistic for the YLS/CMI in predicting running away following assessment

YLS/CMI Total score	Sensitivity % (N)	Specificity % (N)	False Negative % (N)	False Positive % (N)
15	100 (10)	11.5 (3)	0 (0)	88.5 (23)
16	100 (10)	15.4 (4)	0 (0)	84.6 (22)
17	100 (10)	23.1 (6)	0 (0)	76.9 (20)
18	100 (10)	23.1 (6)	0 (0)	76.9 (20)
19	100 (10)	30.8 (8)	0 (0)	69.2 (18)
20	100 (10)	30.8 (8)	0 (0)	69.2 (18)
21	90 (9)	50 (13)	10 (1)	50 (13)
22	80 (8)	53.8 (14)	20 (2)	46.2 (12)
23	80 (8)	61.5 (16)	20 (2)	38.5 (10)
24	60 (6)	69.2 (18)	40 (4)	30.8 (8)
25	60 (6)	73.1 (19)	40 (4)	26.9 (7)

Note. Classification statistics using YLS/CMI cut-scores (15–25) in the CSEC group to predict running away following assessment. Sensitivity=cut score predicted running away, girl did actually run away; Specificity=cut score predicted no running away, did not actually run away; False Negative=cut score predicted no running away, girl did actually run away; False Positive=cut score predicted running away, girl did not actually run away. N represents the number of girls classified for each classification statistic based the corresponding cut score.