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Childhood Abuse and Neglect, Attachment States of Mind, and Non-suicidal Self-injury

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Abstract

This investigation examined preoccupied attachment states of mind as both a risk factor for non-suicidal self-injury (NSSI) and as a mechanism by which prospectively assessed childhood experiences of abuse and neglect predicted the frequency/severity of NSSI behaviour up to age 26 years in 164 individuals (83 females) who were followed from birth in the Minnesota Longitudinal Study of Risk and Adaptation. Preoccupied (but not dismissing) states of mind regarding both childhood caregivers and adult romantic partners were correlated with more frequent/severe NSSI. Furthermore, preoccupied states of mind regarding caregivers partially accounted for the association between childhood abuse/neglect and NSSI. This work represents a rare prospective test of a developmental psychopathology framework for understanding NSSI behavior, in which atypical caregiving experiences are carried forward through attachment representations of caregivers that reflect behavioral risk.

Keywords

non-suicidal self-injury; attachment states of mind; physical abuse; sexual abuse; neglect; mediation

Non-suicidal self-injury (NSSI) is defined as the intentional, self-inflicted destruction of body tissue performed without suicidal intent using methods that are not socially sanctioned (Nixon & Heath, 2009). Between 4 and 38% of high school and university students report at least one lifetime incident of NSSI (Brunner et al., 2014; Heath, Schaub, Holly, & Nixon, 2009; Muehlenklamp, Claes, Havertape, & Plener, 2012), with even greater rates reported in clinical populations of youth and young adults (38 to 67%; Heath et al., 2009). NSSI is most commonly reported as a means of regulating negative affect, though social functions (i.e., to exert influence over a social other, including primary caregivers, peers, romantic partners) are also cited (see Klonsky, 2007 for a review). With regard to affect regulation, self-injurers are believed to have a limited understanding of emotional experience and access to few

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appropriate coping strategies to manage emotional distress, deficits believed to stem from inadequate childhood caregiving experiences (see Linehan, 1993; Yates, 2009). From a social function perspective, NSSI may serve as a communicative behavior in order to obtain caregiving from social others (i.e., childhood caregivers or romantic partners) who are otherwise inattentive or inconsistent in their provision of care (Nock, 2008). In this way, NSSI is believed to have roots in individuals' interpersonal milieus, including adverse early caregiving experiences and subsequent relationships with peers or romantic partners (see Crowell, Beauchaine, & Linehan, 2009; Linehan, 1993; Yates, 2009).

Despite considerable evidence that *retrospective reports* of childhood maltreatment are associated with NSSI behavior in adulthood (e.g., Brunner et al., 2013; Di Pierro, Sarno, Perego, Gallucci, & Madeddu, 2012; Martin et al., 2016; Swannell et al., 2012; see also Lang & Sharma-Patel, 2011; Yates, 2009 for reviews), only one investigation has studied this association prospectively. Specifically, Yates, Carlson, and Egeland (2008), using data from the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA; Sroufe, Egeland, Carlson, & Collins, 2005), demonstrated that prospectively documented childhood experiences of abuse/neglect were associated with more frequent and severe NSSI up to at age 26 years. Additionally, little research has focused on testing theoretically-derived mechanisms that might account, in whole or in part, for associations between childhood experiences of abuse or neglect and NSSI behavior.

That said, Yates (2009) proposed a developmental psychopathology framework for studying the origins of NSSI, describing various mechanisms by which NSSI behavior might emerge over development in response to adverse childhood caregiving experiences. One such mechanism involves individuals' representations of close relationships, suggesting that developing insecure and/or disorganized attachment representations of maltreating caregivers might account for identified associations between childhood maltreatment and later NSSI behavior (see also Carroll, Schaffer, Spensley, & Abramowitz, 1980; van der Kolk, Perry, & Herman, 1991). The only empirical analysis of this proposed mechanism through insecure/disorganized attachment assessed in infancy was not supported (Yates, 2005 as cited in Yates, 2009). However, additional theory suggests that *insecure (dismissing, preoccupied) and/or disorganized (unresolved) attachment states of mind in adulthood*, which reflect adults' representations of early experiences with attachment figures, might account for the association between abuse and/or neglect in childhood and later NSSI behavior (see Adam, 1994; Farber, 2000). Specifically, failing to develop a coherent, flexible state of mind regarding negative attachment experiences may leave individuals vulnerable to psychologically disordered behavior throughout the lifespan (see Allen, Moore, Kuperminc, & Bell, 1998; Fonagy & Target, 1995).

As mentioned above, theorists also suggest that relational challenges outside the family of origin (i.e., with peers or romantic partners) may maintain NSSI behavior (see Crowell et al., 2009). Based on established links between self-reported romantic attachment styles and affect regulation capacity (see Mikulincer & Shaver, 2007), a small corpus of research has demonstrated associations between anxious romantic attachment styles and NSSI (Fung, 2008; Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010; but see Fitzpatrick et al., 2013 for contradictory results). However, the unique contributions of attachment states of

mind regarding multiple social others (i.e., caregivers, romantic partners) have yet to be explored in tandem. In large part, the variation in how attachment tends to be assessed (interview vs. self-report; Roisman, 2009) has precluded a direct comparison of the significance of individuals' attachment-related representations of their childhood caregivers and of their romantic relationships for NSSI.

Preoccupied States of Mind Regarding Attachment and NSSI

In the field of developmental psychology, the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985/1996) is the most well-validated assessment of adults' states of mind regarding *relationships with childhood primary caregivers*. Adults' states of mind regarding *their romantic relationships* can also be assessed using the Current Relationship Interview (CRI; Crowell & Owens, 1996), which parallels the AAI in administration and coding method. The coding systems for both interviews focus on the degree to which individuals access and reflect on experiences within important relationships with attachment figures, some of which may be painful or traumatic, and generate a narrative of these memories that is free of contradictions and demonstrates a coherent depiction of perceived events and their impact upon the self (see Crowell & Owens, 1996; Hesse, 2016).

AAI and CRI states of mind are often coded with respect to four possible classifications representing individuals' strategies for managing emotional responses to potentially difficult attachment-related material (Crowell & Owens, 1996; Main, Goldwyn, & Hesse, 2002; 2008). These classifications include *autonomous-secure* (individuals coherently discuss negative and positive relational experiences), *dismissing* (individuals minimize or deny the impact of negative relational experiences), *preoccupied* (individuals excessively blame self or relational other for negative experiences, and/or become emotionally entangled in prior experiences as evidenced by extreme anger or passive speech patterns), and *unresolved* (individuals fail to maintain organized discourse regarding loss of an attachment figure or abuse within important relationships).

Though a large corpus of empirical research has productively leveraged categorical approaches to coding the AAI (see Steele & Steele, 2008; Van IJzendoorn, 1995; Bakermans-Kranenburg & Van IJzendoorn, 2009 for reviews) and the CRI (Owens et al., 1995; Roisman, Collins, Sroufe, & Egeland, 2005; Treboux, Crowell, & Waters, 2004), a great deal of recent factor analytic and taxometric evidence suggests that the rating scales coded from the AAI and CRI actually reflect two relatively independent state of mind dimensions (Bernier, Larose, Boivin, & Soucy, 2004; Haltigan, Roisman, & Haydon, 2014; Haltigan, Leerkes et al., 2014; Larose & Bernier, 2001; Macfie et al., 2014; Martin et al., 2017; Raby, Labella, Martin, Egeland, & Roisman, 2017; Roisman, Fraley, & Belsky, 2007; Whipple, Bernier, & Mageau, 2011). More specifically, empirically-derived state of mind dimensions include *dismissing states of mind*, featuring minimization or denial of emotional distress and attachment needs within close relationships, and *preoccupied states of mind*, characterized by emotionally entangled or psychologically confused discussion of relational experiences, evidenced by passive or angry discourse and/or unresolved speech suggesting persistent rumination upon distressing experience.

Of particular note, existing research has identified unique correlates of dismissing and preoccupied states of mind. For example, dismissing states of mind have been linked to characteristics believed to reflect the suppression of emotional distress (e.g., Bernier et al., 2004; Fortuna, Roisman, Haydon, Groh, & Holland, 2011; Larose & Bernier, 2001; Larose, Bernier & Soucy, 2005; Roisman, Tsai, & Chang, 2004). In contrast, preoccupied states of mind have been associated with emotional dysregulation or heightening of affect. Specifically, preoccupied states of mind have been linked with more self-reported distress (Bernier et al., 2004; Larose & Bernier, 2001; Larose et al., 2005; Roisman et al., 2004; Tarabulsy et al., 2012), expressing more negative affect during conflict discussions with relational others (Fortuna et al., 2011; Haydon, Roisman, & Burt, 2012), identifying with more negative self-views (Haydon et al., 2011), and with dysregulated emotional experiences during the AAI (Roisman et al., 2004). Additional researchers suggest that individuals with preoccupied states of mind tend to use detrimental emotion regulation strategies involving elevated emotional needs and reactions, as well as rumination upon emotionally distressing experiences (Cole-Detke & Kobak, 1996; Kobak et al., 1993; Kobak & Sceery, 1988).

Similar characteristics have also been identified among individuals engaging in NSSI. In particular, NSSI has been linked to deficits in emotion regulation (Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Martin, Bureau, Yurkowski, Lafontaine, & Cloutier, 2016), high negative emotionality (Glenn, Blumenthal, Klonsky, & Hajcak, 2011; Najmi, Wegner, & Nock, 2007; Nock & Mendes, 2008; Plener, Bubalo, Fladung, Ludolph, & Lulé, 2012), and ruminative tendencies (Selby, Franklin, Carson-Wong, & Rizvi, 2013; Voon, Hasking, & Martin, 2014; Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013). Thus, research and theory support the hypothesis that preoccupied (but not dismissing) attachment states of mind regarding both childhood caregivers and adult romantic partners should be associated with NSSI.

Consistent with this prediction, Martin et al. (2017) report that adults' preoccupied (but not dismissing) states of mind regarding childhood caregivers were associated with increased risk for NSSI. Importantly, the sample that was the focus of Martin et al.'s (2017) research was comprised primarily of university students, and assessed only states of mind regarding childhood caregivers, and not states of mind regarding romantic partners. As such, further research is needed to determine if associations between preoccupied state of mind and NSSI extend to: (a) higher-risk populations and (b) states of mind regarding adult romantic partners. To this end, our first aim was to replicate and extend the Martin et al.'s findings (2017) by testing the hypothesis that preoccupied—but not dismissing—states of mind regarding both childhood caregivers and adult romantic partners would be correlated with NSSI behaviour in a distinct sample of individuals who had experienced socioeconomic risk in childhood.

Preoccupied States of Mind may Account for the Association between Childhood Abuse or Neglect and NSSI

In addition to the theoretical and empirical support summarized above regarding associations between preoccupied attachment states of mind and NSSI, recent evidence based on

prospective, longitudinal data demonstrate that childhood experiences of abuse and neglect predict preoccupied attachment states of mind regarding childhood caregivers. For example, using data from the MLSRA, Raby et al. (2017) reported that the experience of childhood abuse or neglect increased the risk of preoccupied states of mind regarding caregivers at age 26 years (see also Roisman et al., 2017). However, abuse and neglect experiences in this sample did not predict preoccupied states of mind regarding romantic partners. Moreover, as aforementioned, an earlier investigation of the MLRSA indicated that experiences of childhood maltreatment predicted engagement in more frequent and severe NSSI behavior by age 26 years (Yates et al., 2008). Taken together, these findings suggest that preoccupied states of mind regarding caregivers (but not romantic partners) may account for the association between childhood abuse or neglect experiences and engagement in NSSI.

The current study used prospective, longitudinal data from the MSLRA and builds on the prior reports from Raby et al. (2017) and Yates et al. (2008) in two key respects. First, we test whether preoccupied states of mind regarding childhood caregivers and romantic partners are associated with risk for NSSI in this higher-risk sample. Second, we test for the first time the hypothesis that preoccupied attachment states of mind regarding childhood caregivers will account, at least in part, for the association between childhood neglect and abuse experiences and engagement in frequent/severe NSSI behavior by early adulthood. To our knowledge, the MLSRA uniquely affords the opportunity to test this theoretically based hypothesis.

In sum, this investigation consisted of (a) replicating and extending the findings of Martin et al. (2017) in a higher risk sample of young adults, and exploring associations between attachment states of mind regarding romantic partners and NSSI behaviour, and (b) revisiting the MLSRA data to extend prior results by incorporating previously unreported measures, specifically dismissing and preoccupied attachment states of mind at age 19 years, and exploring preoccupied attachment states of mind as a potential mediator of the relationship between childhood abuse and neglect and NSSI behaviour.

Method

Participants

The MLSRA is an ongoing study of development from infancy through adulthood (Sroufe et al., 2005). A total of 267 pregnant mothers living below the poverty line and receiving prenatal services through the local health department in Minneapolis, Minnesota were initially recruited between 1975 and 1977. At the time of the child's (target participant's) birth, 48% of mothers were teenagers ($M = 20.5$ years, $SD = 3.74$, range = 12 – 34 years), 65% were single mothers, and 42% had not completed high school. The current subsample of participants were selected based on their completion of an interview regarding NSSI at age 26 years ($N = 164$; 50.6% female). Within this analytic sample, approximately 68% of participants were Caucasian, 11% were African American, 18% identified as mixed race, and 3% were of Native American, Hispanic, or Asian American descent. By age 26 years, 8.5% of individuals had not completed high school (or equivalent), 27.5% had earned a high school diploma or GED, 48.2% had completed some college, and 15.9% had completed a college degree or graduate studies.

The analytic sample for this report did not differ from the original sample in terms of mothers' age or marital status at the child's birth, or ethnicity. However, those who had completed the AAI or the CRI had higher childhood socioeconomic status (SES) than those without AAI or CRI data (see Measures section below for measurement details; AAI: $M = 16.82$, $SD = 6.47$ vs. $M = 23.51$, $SD = 10.50$, $t(198) = -3.71$, $p < .001$; $d = .68$; CRI: $M = 19.45$, $SD = 7.51$ vs. $M = 24.36$, $SD = 11.39$, $t(198) = -3.45$, $p < .01$; $d = .49$), and more years of maternal education (AAI: $M = 11.51$, $SD = 1.80$ vs. $M = 12.43$, $SD = 1.69$, $t(264) = -4.20$, $p < .001$; $d = .53$; CRI: $M = 11.79$, $SD = 1.73$ vs. $M = 12.44$, $SD = 1.80$, $t(264) = -2.99$, $p < .01$; $d = .37$).

Measures

Adverse childhood caregiving experiences.—The MLSRA uses the rubric *childhood experiences of adverse caregiving* as an umbrella term to refer to a variety of atypical parent-child experiences that were prospectively measured in the MLSRA cohort and are believed to be harmful to children's development. The present study focused exclusively on information collected about MLSRA participants' adverse caregiving experiences of physical abuse, sexual abuse, and neglect. This information was re-coded to apply contemporaneous definitions of abuse and neglect, to identify the specific perpetrator and ages of the abuse and neglect experiences, and to assess the reliability of those coding decisions. Coding criteria were based on definitions developed by the Centers for Disease Control and Prevention (CDC) in order to "promote consistent terminology and data collection related to child maltreatment" (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 4). The coding of such experiences included: 1) neglect of a child's basic physical or cognitive needs, defined as a caregiver's failure to provide adequate hygiene, shelter, clothing, medical care, supervision, or education, 2) physical abuse, defined as a caregiver's "intentional use of physical force against a child that results, or has the potential to result in, physical injury" (Leeb et al., 2008, p. 14), 3) sexual abuse, defined as sexual contact (e.g., molestation, rape) or noncontact exploitation (e.g., intentional exposure of child to pornography) by a custodial caregiver or by a perpetrator five or more years older than the target child. Although the CDC criteria only addresses sexual abuse perpetrated by a caregiver, the inclusion of non-caregiving perpetrators and the use of a five-year age cut-off is consistent with other research in this area (e.g., Stoltenborgh, Van IJzendoorn, Euser & Bakermans-Kranenburg, 2011).

These CDC definitions were supplemented by a set of more specific coding guidelines that distinguished clear indicators of physical abuse, sexual abuse, and physical/cognitive neglect from ambiguous indicators that were not sufficient for classification in isolation of other evidence. These additional guidelines were developed in consultation with MLSRA senior researchers, Minnesota state law, and available research literature (e.g., Barnett, Manly, & Cicchetti, 1993), and are available from the corresponding author upon request. However, the classifications of childhood experiences of abuse and neglect do not necessarily reflect criteria for maltreatment used by child protective services, which vary from state to state.

Although emotional unavailability or lack of caregiver responsiveness has proven to be an important dimension of adverse caregiving (especially for young children), with pernicious

developmental consequences (National Scientific Council on the Developing Child, 2012; Sroufe et al., 2005), this dimension was not included in the current coding criteria due to insufficient information across developmental periods. In addition, exposure to violence between caregivers and other forms and environmental violence were not included in the current set of codes. Exposure to violence between caregivers is captured by a separate variable in the MLSRA dataset (e.g., Narayan, Englund, & Egeland, 2013), and insufficient information was available to code adequately exposure to other forms of environmental violence.

Judgments regarding abuse and neglect were made for participants whose records had been previously flagged as potentially ever abused or neglected ($N=139$, 52% of the original sample). For these cases, all available data collected from birth to 17.5 years (up to 25 assessments) were reviewed for information regarding caregiving quality, physical discipline, supervision, home environment, physical and sexual assault, child protective service involvement, and foster care history. Information was obtained from parent-child observations, caregiver interviews, reviews of available child protection and medical records, adolescent reports, and teacher interviews. Disclosures of childhood physical or sexual abuse during the AAI were not included in the present set of codes except in situations in which an experience of abuse was initially identified based on childhood records but there was insufficient detail to code the specific developmental period during which abuse or neglect occurred. In these cases, available AAIs were consulted only for clarifying information about the incident.

Coding focused on the presence or absence of physical abuse, sexual abuse, and neglect across each of four developmental periods (Infancy: birth to 24 months; Early Childhood: 25 months to five years; Middle Childhood: 6–12 years; and Adolescence: 13–17.5 years). Two coders reviewed each case and demonstrated good to excellent reliability for all parameters: kappas were between .80 and .98 for presence or absence of abuse and neglect subtypes, and .80 and .84 for presence or absence of each type of adverse caregiving during each development period. All discrepancies were resolved by consensus.

Within the full sample of MLSRA participants ($N=267$), 102 individuals were classified as having ever experienced physical abuse, sexual abuse, and/or neglect; 81 were coded as not having experienced abuse or neglect; and the status of 84 was deemed unclear due to missing data (see below). By developmental period, 47 individuals were classified as being abused and/or neglected in infancy (of the 211 with sufficient data to allow for confident classifications of abuse and/or neglect during this developmental period), 66 in early childhood (of the 185 with sufficient data during this developmental period), 66 in middle childhood (of the 190 with sufficient data during this developmental period), and 21 in adolescence (of the 179 with sufficient data during this developmental period).

Within the subsample of participants with NSSI data at age 26 ($N=164$), 79 individuals (48%) were classified as having experienced at least one instance of childhood abuse or neglect. Specifically, 64% of these individuals had experienced physical/cognitive neglect, 60% had experienced physical abuse, and 42% had been sexually abused (not mutually exclusive). Among this abused/neglected group, 36% experienced abuse or neglect in

infancy, 65% during early childhood, 72% during middle childhood, and 23% during adolescence (not mutually exclusive). Moreover, 34% of the abused/neglected group had atypical experiences during one developmental period, 33% during two periods, 23% during three periods, and 3% during all four developmental periods, and 8% of participants had insufficient data to determine the number of developmental periods (numbers sum to more than 100% due to rounding).

In order to distinguish participants who had not experienced abuse or neglect from those with missing data, abuse or neglect variables were coded as missing if: (a) the participant was not coded as having been abused or neglected based on the available information, and (b) the participant was missing two or more full assessments within any given developmental period. Within the subsample of participants with NSSI data at age 26 years, 15 individuals were classified as missing information related to the current classification of experiencing abuse or neglect. The remaining 70 individuals were deemed to have not experienced abuse or neglect. The number of missing assessments for this group did not differ from the group of individuals who were classified as having experienced abuse or neglect ($t = -0.69$, $p = .49$, $d = .01$), indicating that similar amounts of information were available for these two groups.

Attachment states of mind regarding childhood caregivers.—The AAI (George et al., 1985/1996) is a semi-structured interview concerning childhood relationships with caregivers, past trauma (e.g., abuse, loss), and individuals' perceptions regarding the impact of prior attachment-related experiences on current functioning. Trained and reliable coders rated verbatim transcripts of the AAIs using the system outlined by Main and Goldwyn (1998), which consists of several 9-point rating scales. Three rating scales (idealization, involving anger, derogation) were coded separately for mothers and fathers. Ratings of unresolved discourse (unresolved loss, unresolved abuse) were rated from discussions of loss or abuse. The remaining scales (lack of recall, metacognitive monitoring, passivity of discourse, fear of loss, coherence of transcript/mind) were coded based on overall discourse style. In the current sample, the AAI was administered at both ages 19 ($N = 151$) and at age 26 years ($N = 164$).

A dimensional approach to scaling participants' AAI states of mind was used. Of note, the use of the AAI at age 19 years was unique to this study compared to other analyses from the MLSRA (Raby et al., 2017). Age 19 year attachment states of mind were especially targeted as they temporally preceded the assessment of NSSI behaviour, permitting more clarity for our planned mediation analyses. However, because coding of the AAI at age 19 years did not include ratings for passivity of discourse, a key marker of preoccupied states of mind, we also included the AAI states of mind from age 26 years as a secondary check of results obtained with the age 19 year AAI. Intra-class correlations (ICCs) for AAI rating scales at age 19 years reflected good inter-rater reliability (ICCs between .73 and .95) based on a sample of 49 double coded cases. Results of an exploratory factor analysis (EFA) using the 19 year AAI rating scales (note that fear of loss and metacognitive monitoring scales were excluded *a priori* from EFA due to low variance) yielded the same two factors as identified in prior research of the factor structure of the AAI in this (at age 26 years; Raby et al., 2017) and other (e.g., Haltigan et al., 2014) samples. Specifically, two dimensions were identified,

one reflecting dismissing states of mind, which accounted for 28.96% of variance and comprised maternal idealization (loading = .61), lack of memory (loading = .51), and paternal idealization (loading = .41), and a second dimension reflecting preoccupied states of mind, which accounted for 23.83% of variance and comprised maternal anger (loading = .76), paternal anger (loading = .63), and unresolved abuse (loading = .53); there were no cross-loadings > .40 for any variables included in the EFA. Derogation and unresolved loss scores were ultimately removed from the creation of state of mind composites due to loadings < .40 on both factors. Although the coherence of mind rating loaded primarily on the dismissing factor (.99), these ratings were excluded from composites in order to align with practices established in recent research (see Haltigan et al., 2014). Specifically, the coherence of mind scale is intended to be a summary rating on which participants are assigned low ratings if there is evidence of either dismissing or preoccupied discourse during the AAI—thus by definition this rating is not unique to either state of mind. Dismissing and preoccupied composites at age 19 years were created by averaging relevant rating scales, and each demonstrated acceptable internal consistency (dismissing: $\alpha = .61$; preoccupied: $\alpha = .72$).

Given the slight variation from standard coding practices inherent in the ratings of AAI at age 19 years (i.e., passivity was not coded), we also included analyses using the AAI at age 26 years to evaluate the robustness of the results. AAI subscale ratings at age 26 years also demonstrated adequate inter-rater reliability across 44 randomly selected cases (ICCs between .65 and .94). A previous EFA of the AAI ratings scales at age 26 years reported in Raby et al. (2017) identified dismissing (mother idealization, father idealization, lack of recall) and preoccupied (passivity, anger regarding mother, anger regarding father, unresolved abuse) state of mind dimensions, which were used in current analyses. Composites for dismissing and preoccupied states of mind regarding childhood caregivers at age 26 years were created by averaging relevant rating scales, and both dismissing ($\alpha = .72$) and preoccupied ($\alpha = .69$) states of mind at 26 years demonstrated acceptable reliability. AAI dismissing and preoccupied dimensions have also demonstrated acceptable internal consistency across prior investigations of both normative (e.g., Haltigan, Roisman, & Haydon, 2014; Haltigan, Leerkes et al., 2014; Whipple et al., 2011) and at-risk populations (Macfie et al., 2014; Martin et al., 2017).

Attachment states of mind regarding romantic partners.—The CRI (Crowell & Owens, 1996) was modeled after the AAI to assess attachment states of mind regarding romantic partners. The CRI was completed when participants were 20–21 and 26–28 years old with participants who had been in a romantic relationship for at least six months; information from the two assessments was aggregated to maximize sample size for the current study. For participants who had completed the CRI at both time points ($n = 54$), information from the 26–28 year assessment was selected in order to mirror the approach adopted in earlier analyses of these data for consistency in the literature (Raby et al., 2017). In total, 116 participants provided CRI data (33 from age 20–21 year assessment, 83 from age 26–28 year assessment), but two cases were excluded from current analyses due to missing NSSI data. The samples involving AAI and CRI data were not mutually exclusive—

all 114 participants who completed the CRI had also completed the AAI, and 50 participants with AAI data did not complete the CRI.

Transcripts were rated by coders trained in both the CRI (Crowell & Owens, 1996) and AAI coding (Main & Goldwyn, 1998) systems, and CRI coders were blind to AAI ratings. Dimensional scores from CRI state of mind scales (valuing intimacy, valuing independence, angry speech regarding partner, angry speech regarding others, derogation of partner/attachment, idealization of partner/relationship, passivity, unresolved discourse, coherence) were used. Inter-rater reliability based on 45 cases yielded adequate ICCs ranging from .60 to .84, with the exception of idealization (ICC = .46). An EFA of these data reported by Raby et al. (2017) yielded CRI state of mind factors similar to those underlying the AAI: dismissing [coherence (reversed), valuing intimacy (reversed), idealization of partner; $\alpha = .82$] and preoccupied (passivity, anger regarding partner, anger regarding others, unresolved discourse; $\alpha = .69$). Relevant scales were averaged to create composite scores ranging from 1 to 9. Despite suboptimal reliability for CRI idealization, scores were included in composites as idealization is focal in judging attachment states of mind. Neither results of the EFA nor of primary analyses differed when excluding idealization.

Non-suicidal self-injury (NSSI).—A semi-structured interview (see Yates et al., 2008) was used to assess the frequency and severity of NSSI behaviour that individuals had engaged in up to age 26 years. Participants were asked if they had ever intentionally hurt themselves without suicidal intent, using methods such as cutting, burning, or hitting themselves. When reported behavior matched definitional criteria for NSSI, follow-up questions were asked regarding the number of incidents and specific behaviors used. Two coders rated open-ended responses to these questions to rate NSSI behavior on a 6-point scale representing increasing frequency and severity of NSSI: (1) none, (2) single mild/ambiguous incident, (3) multiple ambiguous or single clear incident, (4) three or more clear incidents, (5) more than 10 clear incidents prior to 18, and (6) more than 10 clear incidents extending into adulthood. Inter-rater reliability for these ratings was high (ICC = .99), and disagreements were conferenced.

Thirty-four participants (20.7%) reported having engaged in NSSI at least once up to age 26 years (i.e., scores greater than 1 on the frequency/severity scale). The average age of onset for NSSI was 14.23 years ($SD = 4.07$; range = 4 to 23 years) and average age of offset was 19.30 years ($SD = 5.27$; range = 9 to 26 years), resulting in an average duration of NSSI engagement of 5.07 years ($SD = 5.25$; range = 0 to 21 years). Within this subset of individuals, 63% reported having engaged in self-hitting, 41% in cutting behavior, and 21% in self-burning (not mutually exclusive). Moreover, 59% reported engaging in NSSI to relieve feelings of anger, depression or guilt; 38% reported interpersonal triggers including relational conflict with peers, family or romantic partners; and 7% reported self-harming when intoxicated (not mutually exclusive).

Covariates.—Four demographic variables used in prior reports regarding caregiving antecedents of adult social or psychological adjustment (e.g., Haydon, Roisman, Owen, Booth-LaForce, & Cox, 2014; Raby, Roisman, Fraley, & Simpson, 2015) were included to examine the robustness of focal associations; these were child sex, child ethnicity, maternal

education, and childhood socioeconomic status (SES). The majority of the sample was White/non-Hispanic; thus, a binary variable representing ethnicity (1 = White/non-Hispanic, 0 = otherwise) was used. Maternal education was operationalized as the number of years of education each mother had completed, and was collected 3 months prenatally, at 42 months, grades 1, 2, 3, and 6, and at age 16; ratings were averaged across assessments to create a composite measure of maternal education throughout childhood. Childhood SES was represented by Duncan's Socioeconomic Index, a widely used indicator of occupational ranking (Stevens & Featherman, 1981). Scores were based on the mother's occupational status collected at 42 months, 54 months, grades 1–3, grade 6, and age 16; scores were averaged to create a composite of mothers' occupational status throughout childhood.

Results

All analyses were completed using MPlus version 7.4 (Muthén & Muthén, 1998–2012) using full-information maximum likelihood (FIML), which produces less biased and more consistent parameter estimates than pairwise or listwise deletion, in order to account for missing data (Graham, 2009). The use of FIML was supported by analyses demonstrating that missing data were missing at random (Little's MCAR tests: $\chi^2(25) = 31.88, p = .16$). Mediation analyses were conducted using maximum likelihood with robust standard errors to correct for non-normality of our outcome variable of NSSI frequency/severity. Descriptive statistics and zero-order correlations for primary study variables are listed in Table 1. Analyses described below are organized around our two primary hypotheses.

Are Preoccupied Attachment States of Mind a Risk Factor for NSSI?

Correlations in Table 1 show that, as hypothesized, preoccupied (but not dismissing) states of mind regarding both childhood caregivers and adult romantic partners were associated with more frequent/severe NSSI. More specifically, results demonstrated significant positive correlations between NSSI and preoccupied states of mind as assessed from the AAI and the CRI; in contrast, correlations between AAI and CRI dismissing states of mind and NSSI were trivial in magnitude. Steiger's *z*-tests (Lee & Preacher, 2013; Steiger, 1980) were used to examine whether the magnitude of correlations between dismissing states of mind and NSSI versus preoccupied states of mind and NSSI differed significantly. As expected, the correlations between preoccupied states of mind and NSSI were significantly larger than the correlations between dismissing states of mind and NSSI for the AAI at 19 years ($z = -3.68, p < .001, r = -.29$), the AAI at 26 years ($z = -2.71, p < .001, r = -.21$), and the CRI ($z = -2.02, p < .05; r = -.16$). Follow-up partial correlations confirmed unique associations between preoccupied states of mind regarding both caregivers and romantic partners and NSSI even after controlling for respective dismissing states of mind: AAI at 19 years (partial $r = .29, p < .001$), AAI at 26 years (partial $r = .29, p < .001$), and CRI (partial $r = .25, p < .05$).

Are Childhood Abuse/Neglect Experiences Associated with NSSI through Preoccupied States of Mind?

Associations between childhood abuse/neglect experiences and preoccupied states of mind.—We first evaluated the association between childhood abuse/neglect and

preoccupied attachment states of mind at age 19 years. Separate regression models were used to test the predictive effects of having ever experienced abuse or neglect on dismissing and preoccupied attachment states of mind regarding caregivers at age 19 years, paralleling the approach adopted by Raby et al. (2017) to determine predictive associations between childhood abuse and neglect and attachment states of mind at age 26 years. Within each model, the abuse or neglect variable was entered as a first step and early demographic covariates (participant sex, ethnicity, maternal education, and childhood SES) were entered in a second step. In the final step, the non-focal state of mind dimension was included to ensure that predictive significance of childhood abuse or neglect was unique to the particular AAI state of mind dimension under study (i.e., dismissing or preoccupied). Altogether, our results aligned with those based on the age 26 years AAIs previously reported by Raby et al. (2017); individuals who were abused and/or neglected in childhood were at increased risk for preoccupied (but not dismissing) states of mind regarding caregivers at 19 years, and this association was robust to the inclusion of covariates (i.e., participant sex, ethnicity, maternal education, childhood SES) and AAI dismissing states of mind at 19 years (see Table 2).

Is the association between childhood abuse/neglect and NSSI mediated by preoccupied states of mind about early caregivers?—Although correlation analyses in this study yielded a small but statistically significant correlation between childhood abuse or neglect and CRI preoccupied state of mind, this variation from the non-significant results pertinent to the same association reported by Raby et al. (2017) was due to slight sample variation between the two studies (two individuals were excluded from the current analyses as they did not have NSSI data). Moreover, the significant correlation identified here was not robust to the inclusion of CRI dismissing states of mind (partial $r = .09$, $p = .38$) or demographic covariates (partial $r = .14$, $p = .16$). Thus, only preoccupied states of mind regarding childhood caregivers were explored as potential mediators. To test the hypothesis that preoccupied states of mind regarding childhood caregivers may account for the association between experiencing childhood abuse or neglect and having engaged in NSSI behaviour prior to age 26 years, two mediation models were conducted using childhood abuse or neglect status as the predictor. The focal analyses included AAI preoccupied state of mind at 19 years as the mediator. Given limitations to the coding of AAI preoccupied state of mind at age 19 years, we then evaluated the robustness of these results by testing AAI preoccupied state of mind at 26 years as the mediator. Participant sex, ethnicity, childhood SES and maternal education in childhood were included as covariates in both models. The results of these analyses are presented in Table 3.

Preoccupied states of mind regarding childhood caregivers assessed at age 19 years significantly accounted for the association between childhood abuse or neglect and the frequency/severity of NSSI behavior by age 26 years. The indirect association also was statistically significant when preoccupied state of mind regarding caregivers at age 26 years was used as the mediator¹. AAI preoccupied state of mind at age 19 and 26 years accounted for roughly 21–29% of the prospective association between childhood abuse and neglect and NSSI frequency/severity (indicated by the obtained ratios of indirect to total effects). Mediation effects were roughly medium in magnitude according to the κ^2 effect size metric

(see Table 3; small effect = .01, medium effect = .09, large effect = .25; Preacher & Kelly, 2011).

Discussion

The first aim of the current investigation sought was to examine whether preoccupied states of mind are associated with increased risk of NSSI. The second aim was to test the theoretically based hypothesis that preoccupied states of mind regarding childhood caregivers would account for the association between childhood abuse/neglect experiences and NSSI behavior up to age 26 years using prospective, longitudinal data. Results supported both of these hypotheses. First, preoccupied (but not dismissing) states of mind regarding caregivers and romantic partners were associated with higher NSSI frequency/severity. Second, preoccupied states of mind regarding caregiving experiences partially accounted for the association between childhood abuse/neglect and NSSI.

These results replicate and extend the findings of previous research demonstrating associations between preoccupied attachment states of mind and NSSI (Martin et al., 2017), thereby building on existing empirical work demonstrating that preoccupied attachment states of mind are uniquely associated with characteristics reflecting high emotionality, emotion dysregulation, and rumination upon emotional distress (e.g., Fortuna et al., 2011; Haydon et al., 2011; Tarabulsky et al., 2012). The associations with NSSI appear to be robust across different ages during young adulthood (i.e., ages 19 and age 26 years) and two distinct populations, including samples of young adults from both normative risk (i.e., university students; Martin et al., 2017) and higher risk (i.e., childhood poverty) populations. Another novel contribution of the current work is the finding that preoccupation regarding adult romantic partners also is associated with greater NSSI frequency/severity.

Perhaps even more importantly, the current report presented the first prospective evidence that preoccupied states of mind regarding early caregiving experiences serve as a mechanism by which childhood experiences of abuse/neglect might plausibly increase risk for NSSI behavior. These findings not only suggest the value of a developmental psychopathology approach to studying NSSI, but also corroborate the representational pathway proposed by Yates (2009), such that individuals' experiences of abuse or neglect predicted increased NSSI frequency/severity in part through young adults' continued preoccupation with early experiences. Said another way, in addition to social and psychological detriments directly associated with maltreatment (e.g., Cicchetti & Toth, 2005), developing emotionally entangled and/or psychologically confused representations of atypical childhood caregiving experiences represent one mechanism by which abuse or neglect experiences confer risk for NSSI frequency/severity.

The link between attachment preoccupation and NSSI demonstrated in this study can be interpreted in light of the regulatory role of attachment states of mind as emotion regulation strategies. Allen and colleagues (Allen, 2008; Allen & Manning, 2007; Allen & Miga, 2010) argue that by adolescence, attachment states of mind in part represent individuals' growing capacity for emotion regulation within the social domain. As previously discussed, researchers have found evidence that preoccupied states of mind in particular are associated

with dysregulated emotional experiences (e.g., Bernier et al., 2004; Fortuna et al., 2011; Haydon, Roisman, & Burt, 2012; Haydon et al., 2011; Larose & Bernier, 2001; Roisman et al., 2004; Tarabulsy et al., 2012). Indeed, preoccupied states of mind regarding early caregiving experiences imply continued rumination on these experiences and associated emotional distress. Prior evidence indicates both rumination (e.g., Selby, Franklin, Carson-Wong, & Rizvi, 2013; Voon, Hasking, & Martin, 2014) and dysregulated emotional processes (e.g., Glenn, Blumenthal, Klonsky, & Hajcak, 2011; Plener, Bubalo, Fladung, Ludolph, & Lulé, 2012) are key risk factors for NSSI, and provide one explanation as to why preoccupied states of mind are a mechanism by which childhood abuse or neglect is related to NSSI. Specifically, the heightened emotionality and ruminative tendencies of individuals with preoccupied states of mind regarding early experiences may serve as triggers for NSSI behavior, particularly in combination with deficits in the capacity for regulating emotional distress known to be associated with childhood abuse or neglect (e.g., Kim & Cicchetti, 2009; Maughan & Cicchetti, 2003). Individuals with this developmental history may use NSSI behavior to manage heightened emotional distress in the absence of more appropriate means of coping.

That said, other explanations consistent with attachment theory could also be posited. From a social competence perspective, experiencing childhood abuse or neglect (see Cicchetti & Toth, 2015 for a review), preoccupied states of mind (e.g., Tarabulsy et al., 2012), and NSSI (e.g., Lundh, Wångby-Lundh, & Ulander, 2009) have each been linked to problematic interpersonal relationships. Thus, it is possible that holding a preoccupied state of mind regarding atypical early experiences increases the risk of continued challenges in the interpersonal domain throughout adolescence and early adulthood, leading to increased risk for NSSI behavior. This increased risk may reflect interpersonal triggers for NSSI and/or the use of NSSI as a means of communicating distress and eliciting care from a relational other (see Nock, 2008). Relatedly, from an internal working models standpoint, it is possible that individuals who remain preoccupied with early abuse or neglect may hold representations of relational others as inconsistent in their provision of care or support, increasing the likelihood of engaging in NSSI as an extreme measure that may be more likely to elicit care (see Yates, 2009).

Clinical Implications

Clinically, our findings suggest that targeting individuals' current representations or states of mind regarding early atypical caregiving experiences such as abuse and neglect may be relevant for treatment of NSSI behavior. Indeed, results of the limited clinical research in this regard support this supposition, showing that methods such as transference focused psychotherapy (TFP)—in which individuals are taught to reframe their ways of thinking about and reflecting upon experiences within important interpersonal relationships—result in decreased attachment preoccupation regarding childhood caregivers and corresponding decreases in frequency of self-injuring across a 1-year treatment period (Levy, Yeomans, & Diamond, 2007; see also Levy et al., 2006). Although research regarding the impact of TFP on attachment states of mind and NSSI have primarily involved patients diagnosed with borderline personality disorder, and results are based on small samples, these findings align with the broader expanse of research supporting the utility of similar attachment-base3d

interventions to reduce suicidal ideation, a common comorbid pathology accompanying NSSI, in adolescents and young adults (Ewing, Diamond, & Levy, 2015; Sheftall, Mathias, Furr, & Dougherty, 2013). Additional studies employing TFP with individuals who engage in NSSI without personality pathology, and with larger samples, are required to assess the generalizability of reported treatment outcomes. Adaptation of techniques similar to TFP may also be useful in forming early intervention strategies to prevent NSSI engagement in children with known histories of abuse or neglect, although there is currently no clinical research that tests this hypothesis.

Strengths and Limitations

The current study has several methodological strengths, including its use of well-established, parallel assessments of adults' attachment states of mind regarding childhood caregivers and romantic partners, and the use of a state-of-the-art scaling approach to measuring these states of mind that permit analysis of distinct correlates of dismissing and preoccupied states of mind. Findings also contribute to existing literature by providing empirical support for an attachment representational mechanism by which childhood abuse and neglect experiences are associated with NSSI through its use of prospective data, as the majority of existing research in this area is limited by the use of retrospective assessments of abuse and neglect. The dearth of prospective research in this domain is especially problematic given the developmental emphasis in etiological theories regarding NSSI behavior.

Despite these strengths, some limitations must be noted. First, the frequency/severity of NSSI behavior was assessed retrospectively—a practice common across existing NSSI research. Some individuals reported that they ceased to engage in NSSI prior to having completed either the AAI or CRI, which complicates the interpretation of our mediational findings. Relatedly, despite the heterogeneous nature of NSSI behavior, the current study only included assessment of the frequency/severity of NSSI behavior because the small number of self-injuring participants precluded meaningful, robust comparisons across more nuanced NSSI characteristics. Second, in the mediational model testing AAI preoccupied states of mind at 26 years as a mediator, preoccupied state of mind and NSSI were assessed concurrently, which complicates inferences regarding the direction of effect underlying the obtained results. However, given that results for preoccupied attachment state of mind regarding caregivers at 19 years yielded nearly identical results, we have additional confidence in the direction of effects implied by the proposed model. Finally, the inclusion of unresolved abuse as an indicator of AAI preoccupied states of mind in our composite may have inflated reported associations with childhood abuse or neglect (that said, effects largely remained when unresolved abuse was excluded from consideration)¹.

Despite these limitations, this is one of very few existing projects to have assessed childhood abuse and neglect prospectively, and to have measured both NSSI and attachment state of mind regarding caregivers. Furthermore, it is the *only* project to have also included a comparable assessment of romantic attachment representations. Thus, the MLSRA is entirely unique in its capacity to answer the research questions proposed herein, upon which additional studies can build.

Conclusion

Findings presented in this report based on the MLSRA offer several directions for additional study. Most importantly, researchers should prioritize prospective research designs to study the origins of NSSI, particularly given the strong emphasis on early experiences in etiological theory (see Linehan, 1993; Yates, 2009). Prospective designs should aim to continue the study of unique and shared influences of experiences across multiple social domains throughout development on NSSI. Of note, future research of this sort should explore the potential protective role that secure attachment representations regarding romantic partners may play in reducing the risk of engaging in NSSI behavior for individuals with preoccupied states of mind regarding their childhood caregivers. Moreover, additional prospective investigation will make it possible to study other mechanisms by which childhood abuse or neglect experiences can be linked to NSSI. Although we identify preoccupied attachment states of mind regarding childhood caregivers as one possible such mechanism, childhood abuse or neglect may increase risk for NSSI behavior through a variety of developmental pathways, including— but not limited to —reactivity (e.g., altered physiological stress response processes) and regulatory (e.g., deficits in emotion knowledge and regulation) mechanisms also proposed by Yates, (2009).

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References

- Adam KS (1994). Suicidal behavior and attachment: A developmental model In Sperling MD & Berman H (Eds.), *Attachment in adults: Theory, assessment and treatment* (pp. 275–298). New York: Guilford Press.
- Adrian M , Zeman J , Erdley C , Lisa L , & Sim L (2011). Emotional dysregulation and interpersonal difficulties as risk factors for non-suicidal self-injury in adolescent girls. *Journal of Abnormal Child Psychology*, 39, 389–400.20953828
- Allen JP (2016). The attachment system in adolescence In Cassidy J & Shaver PR (Eds.), *Handbook of attachment: Theory, research and clinical applications* (3rd edition) (pp. 419–435). New York City, NY: The Guilford Press.
- Allen JP , & Manning N (2007). From safety to affect regulation: Attachment from the vantage point of adolescence. *New Directions in Child and Adolescent Development*, 117, 23–29.
- Allen JP , & Miga EM (2010). Attachment in adolescence: A move to the level of regulation. *Journal of Social and Personal Relationships*, 27, 181–190.20431705
- Allen JP , Moore C , Kuperminc G , & Bell K (1998). Attachment and adolescent psychological functioning. *Child Development*, 69, 1406–1419.9839424
- Bakermans-Kranenburg MJ , & van IJzendoorn MH (2009). The first 10,000 Adult Attachment Interviews: Distributions of adult attachment representations in clinical and non-clinical groups. *Attachment & Human Development*, 11, 223–263.19455453
- Bernier A , Larose S , Boivin M , & Soucy N (2004). Attachment state of mind: Implications for adjustment to college. *Journal of Adolescent Research*, 19, 783–806.
- Bowlby J . (1969/1982). *Attachment and loss, vol. I: Attachment* New York City, NY: Basic Books.

- Brunner R , Kaess M , Parzer P , Fischer G , Resch R , Carli V , ..., & Wasserman D . (2013). 3038 – Characteristics of non-suicidal self-injury and suicide attempts among adolescents in Europe: Results from the European Research Consortium Seyle. *European Psychiatry*, 28, 1.21920709
- Carroll J , Schaffer C , Spensley J , & Abramowitz SI (1980). Resisting urges to self-injure. *American Journal of Psychiatry*, 137, 852–853.7386671
- Cicchetti D , & Toth SL (2005). Child maltreatment. *Annual Review of Clinical Psychology*, 1, 409–438.
- Cole-Detke H , & Kobak R (1996). Attachment processes in eating disorder and depression. *Journal of Consulting & Clinical Psychology*, 64, 282–290. doi: 10.1037/0022-006X.64.2.2828871412
- Crowell SE , Beauchaine TP , & Linehan MM (2009). A biosocial developmental model of borderline personality: Elaborating and extending Linehan’s theory. *Psychological Bulletin*, 135, 495–495–510.19379027
- Crowell JA , & Owens G (1996). Current Relationship Interview and scoring system Unpublished manuscript, State University of New York at Stony Brook.
- Ewing ESK , Diamond G , & Levy S (2015). Attachment-based family therapy for depressed and suicidal adolescents: Theory, clinical model, and empirical support. *Attachment & Human Development*, 17, 136–156. doi:10.1080/14616734.2015.100638425778674
- Farber SK (2000). When the body is the target: Self-harm, pain, and traumatic attachments. Northvale, NJ: Jason Aronson.
- Fonagy P , & Target M (1995). Understanding the violent patient: The use of the body and the role of the father. *The International Journal of Psychoanalysis*, 76, 487–501.7558608
- Fortuna K , Roisman GI , Haydon KC , Groh AM , & Holland AS (2011). Attachment states of mind and the quality of young adults’ sibling relationships. *Developmental Psychology*, 47, 1366–1373.21744953
- George C , Kaplan N , & Main M (1985/1996). The Adult Attachment Interview protocol. Unpublished manuscript, University of California, Berkeley.
- Glenn CR , Blumenthal TD , Klonsky ED , & Hajcak G (2011). Emotional reactivity in nonsuicidal self-injury: Divergence between self-report and startle measures. *International Journal of Psychophysiology*, 80, 166–170.21376761
- Graham JW (2009). Missing data analysis: Making it work in the real world. *Annual Reviews of Psychology*, 60, 549–576. doi:10.1146/annurev.psych.58.110405.085530
- Haltigan JD , Roisman GI , & Haydon KC (2014). The latent structure of the Adult Attachment Interview: Exploratory and confirmatory evidence. *Monographs of the Society for Research in Child Development*, 79, 15–35.25100087
- Haydon KC , Roisman GI , & Burt KB (2012). In search of security: The latent structure of the Adult Attachment Interview revisited. *Development and Psychopathology*, 24, 589–606.22559133
- Haydon KC , Roisman GI , Marks MF , & Fraley RC (2011). An empirically derived approach to the latent structure of the Adult Attachment Interview: Additional convergent and discriminant validity evidence. *Attachment & Human Development*, 13, 503–524.21838649
- Hayes AF (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Heath NL , Schaub K , Holly S , & Nixon M-K . (2009). Self-injury today: Review of population and clinical studies in adolescence In Nixon M-K and Heath N (Eds.), *Self-injury in youth: The essential guide to assessment and intervention* (pp. 9–27). New York, NY: Routledge Press.
- Hesse E (2016). The Adult Attachment Interview: Protocol, method of analysis, and selected empirical studies: 1985–2015 In Cassidy J & Shaver PR (Eds.), *Handbook of attachment: Theory, research and clinical applications* (3rd edition) (pp. 553–597). New York City, NY: The Guilford Press.
- Corp IBM . (2013). IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
- Kim J , & Cicchetti D (2009). Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. *Journal of Child Psychology and Psychiatry*, 51, 706–716.20050965
- Klonsky ED (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review*, 27, 226–239.17014942

- Kobak R , & Ferenz-Gillies R (1995). Emotion regulation and depressive symptoms during adolescence: A functionalist perspective. *Development & Psychopathology*, 7, 183–192. doi: 10.1017/S0954579400006416
- Larose S , & Bernier A (2001). Social support processes: Mediators of attachment state of mind and adjustment in late adolescence. *Attachment & Human Development*, 3, 96–120.11708386
- Larose S , Bernier A , & Soucy N (2005). Attachment as a moderator of the effect of security in mentoring on subsequent perceptions of mentoring and relationships quality with college teachers. *Journal of Social and Personal Relationships*, 22, 399–415. doi: 10.1177/0265407505052443
- Lee IA & Preacher KJ (2013, September). Calculation for the test of the difference between two dependent correlations with one variable in common [Computer software]. Available from <http://quantpsy.org>.
- Leeb RT , Paulozzi L , Melanson C , Simon T , Arias I (2008). *Child Maltreatment Surveillance: Uniform Definitions for Public Health and Recommended Data Elements, Version 1.0*. Atlanta, GA: Centers for Disease Control and Prevention and National Center for Injury Prevention and Control.
- Levy KN , Yeomans FE , & Diamond D (2007). Psychodynamic treatments of self-injury. *Journal of Clinical Psychology: In Session*, 63, 1105–1120.17932991
- Linehan MM (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York City, NY: The Guilford Press.
- Main M , & Goldwyn R (1998). *Adult attachment scoring and classification system* Unpublished manuscript, University of California at Berkeley, Berkeley, CA.
- Martin J , Bureau J-F , Yurkowski K , Lafontaine M-F , & Cloutier PF (2016). Heterogeneity of relational backgrounds is associated with variation in non-suicidal self-injurious behavior. *Journal of Abnormal Child Psychology*, 44, 511–522.26133094
- Martin J , Bureau J-F Yurkowski K , Renaud Fournier T , Lafontaine M-F & Cloutier PF (2016). Family-based risk factors for non-suicidal self-injury: Influences of maltreatment, adverse family-life experiences, and relational trauma. *Journal of Adolescence*.
- Martin J , Bureau J-F Lafontaine M-F , Cloutier PF Hsiao C , Pallanca D & Meinz P (2017). Preoccupied but not dismissing attachment states of mind are associated with non-suicidal self-injury. *Development and Psychopathology*, 29. doi:10.1017/S0954579417000050.
- Maughan A , & Cicchetti D (2003). Impact of child maltreatment and interadult violence on children's emotion regulation abilities and socioemotional adjustment. *Child Development*, 73, 1525–1542.
- Muehlenkamp JJ , Claes L , Havertape L , & Plener PL (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, 6, 10–19.22462815
- Muthén LK and Muthén BO . (1998-2015). *Mplus User's Guide*. Seventh Edition. Los Angeles, CA: Muthén & Muthén.
- Nixon M-K & Heath N (2009). Introduction to non-suicidal self-injury in adolescents. In (Nixon M-K & Heath N (Eds.), *Self-injury in youth: The essential guide to assessment and intervention* (pp. 1–6). New York, NY: Routledge Press.
- Nock MK (2008). Actions speak louder than words: An elaborated theoretical model of the social functions of self-injury and other harmful behaviors. *Applied and Preventive Psychology*, 12, 159–168.19122893
- Owens G , Crowell J , Pan H , Treboux D , O'Connor E , & Waters E (1995). The prototype hypothesis and the origins of attachment working models: Adult relationships with parents and romantic partners In Waters E , Vaughn BE , Posada G , & Kondo-Ikemura K (Eds.), *Caregiving, cultural, and cognitive perspectives on secure-base behavior and working models: New growing points of attachment theory and research* (Vol. 60, pp. 216–233). Chicago, IL: University of Chicago Press.
- Plener PL , Bubalo N , Fladung AK , Ludolph AG , & Lulé D (2012). Prone to excitement: Adolescent females with non-suicidal self-injury (NSSI) show altered cortical pattern to emotional and NSS-related material. *Psychiatry Research: Neuroimaging*, 203, 146–152. doi:10.1016/j.psychres.2011.12.012
- Preacher KJ , & Kelley K (2011). Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, 16, 93–115.21500915

- Raby KL , Labella MH , Martin J , Egeland B , & Roisman GI (2017). Adverse caregiving experiences during childhood predict insecure attachment states of mind in adulthood: Prospective, longitudinal evidence from a high-risk sample. *Development and Psychopathology*, 29. doi: 10.1017/S0954579417000037
- Raby KL , Roisman GI , Fraley RC , & Simpson JA (2015). The enduring predictive significance of early maternal sensitivity: Social and academic competence through age 32 years. *Child Development*, 86, 695–708.25521785
- Roisman GI (2007). The psychophysiology of adult attachment relationships: Autonomic reactivity in marital and premarital interactions. *Developmental Psychology*, 43, 39–53.17201507
- Roisman GI (2009). Adult attachment: Toward a rapprochement of methodological cultures. *Current Directions in Psychological Science*, 18, 122–126.
- Roisman GI , Collins WA , Sroufe LA , & Egeland B (2005). Predictors of young adults' representations of and behavior in their current romantic relationship: Prospective tests of the prototype hypothesis. *Attachment and Human Development*, 7, 105–121.16096189
- Roisman GI , Holland A , Fortuna K , Fraley RC , Clausell E , & Clarke A (2007). The Adult Attachment Interview and self-reports of attachment style: an empirical rapprochement. *Journal of Personality and Social Psychology*, 92, 678–697.17469952
- Roisman GI , Rogosch FA , Cicchetti D , Groh AM , Haltigan JD , Haydon KC , ... Steele RD (2017). Attachment states of mind and inferred childhood experiences in maltreated and comparison adolescents from low income families. *Development and Psychopathology*, 29. doi:10.1017/S0954579417000025
- Roisman GI , Tsai JL , & Chiang K-HS (2004). The emotional integration of childhood experience: Physiological, facial, expressive, and self-reported emotional response during the Adult Attachment Interview. *Developmental Psychology*, 40, 776–789.15355165
- Selby EA , Franklin J , Carson-Wong A , & Rizvi SL (2013). Emotional cascades and self-injury: Investigating instability of rumination and negative emotion. *Journal of Clinical Psychology*, 69, 1213–1227.23381733
- Sheftall AH , Mathias CW , Furr RM , & Dougherty DM (2013). Adolescent attachment security, family functioning and suicide attempts. *Attachment & Human Development*, 15, 368–383. doi: 10.1080/14616734.2013.78264923560608
- Sroufe LA , Egeland B , Carlson EA , & Collins WA (2005). *The Development of the Person: The Minnesota Study of Risk and Adaptation from Birth to Adulthood*. New York, NY: Guilford Press.
- Steiger JH (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin*, 87, 245–251.
- Stevens G & Featherman DL (1981). A revised socioeconomic index of occupational status. *Social Science Research*, 10, 364–395.
- Stoltenborgh M , Van IJzendoorn MH , Euser EM , & Bakermans-Kranenburg MJ (2011). A global perspective on child sexual abuse: Meta-analysis of prevalence around the world. *Child Maltreatment*, 16, 79–101.21511741
- Swannell S , Martin G , Page A , Hasking P , Hazell P , Taylor A , & Protani M (2012). Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. *Child Abuse & Neglect*, 36, 572–584.22858062
- Tarabulsky GM , Larose S , Bernier A , Trottier-Sylvain K , Girard D , Vargas M , & Noël C (2012). Attachment states of mind in late adolescence and the quality and course of romantic relationships in adulthood. *Attachment & Human Development*, 14, 621–643.23106182
- Treboux D , Crowell JA , & Waters E (2004). When “new” meets “old”: Configurations of adult attachment representations and their implications for marital functioning. *Developmental Psychology*, 40, 295–314.14979768
- van der Kolk BA , Perry C , & Herman JL (1991). Childhood origins of self-destructive behavior. *The American Journal of Psychiatry*, 148, 1665–1671.1957928
- Voon D , Hasking P , & Martin G (2014). Change in emotion regulation strategy use and its impact on adolescent nonsuicidal self-injury: A three-year longitudinal analysis using latent growth modeling. *Journal of Abnormal Psychology*, 123, 487–498.24933283

- Whipple N , Bernier A , & Mageau GA (2011). A dimensional approach to maternal attachment state of mind: Relations to maternal sensitivity and maternal autonomy support. *Developmental Psychology*, 47, 396–403.21171748
- Yates TM (2009). Developmental pathways from child maltreatment to non-suicidal self-injury In Nock MK (Ed.), *Understanding Non-suicidal Self-injury: Origins, Assessment and Treatment* (pp. 117–138). Washington, DC: American Psychological Association.
- Yates TM , Carlson EA , & Egeland B (2008). A prospective study of child maltreatment and self-injurious behavior in a community sample. *Development & Psychopathology*, 20, 651–671.18423099

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Table 1

Correlations between and Descriptive Statistics of NSSI Frequency/Severity, AAI States of Mind, CRI States of Mind, and Childhood Abuse/Neglect

	1	2	3	4	5	6	7	8
1. Abused/neglected	--	-.11	.28***	.03	.25**	.19*	.16*	.25**
2. AAI19 Ds		--	-.17*	.42***	-.28***	.27***	-.21**	-.13
3. AAI19 Pre			--	-.20*	.52***	.04	.34***	.30***
4. AAI26 Ds				--	-.33***	.35***	-.07	-.06
5. AAI26 Pre					--	.02	.36***	.28***
6. CRI Ds						--	.18*	.04
7. CRI Pre							--	.24**
8. NSSI								--
<i>M</i>	Yes: 79	3.80	1.63	3.07	2.19	4.73	2.45	1.54
<i>SD</i>	No: 70	1.42	1.00	1.65	1.13	1.75	1.17	1.22

Note. $N = 164$. NSSI = non-suicidal self-injury. AAI = Adult Attachment Interview. CRI = Current Relationship Interview. For abused/neglected, 1 = abused/neglected, 0 = not abused/neglected.

Ds = dismissing. Pre = preoccupied.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Childhood Abuse and Neglect and Covariates as Predictors of AAI States of Mind at age 19 years

	AAI Dismissing			AAI Preoccupied		
	β	<i>p</i>	R^2	β	<i>p</i>	R^2
1. Abused/neglected	-.11	.16	.01	.28	<.01	.08
2. Abused/neglected	-.12	.15	.05	.31	<.01	.18
Participant sex	-.16	.04		.31	<.01	
Participant ethnicity	-.06	.44		-.06	.46	
Maternal education	-.03	.76		-.04	.72	
Childhood SES	.02	.88		.12	.22	
3. Abused/neglected	-.09	.34	.06	.29	<.01	.19
Participant sex	-.13	.14		.29	<.01	
Participant ethnicity	-.07	.39		-.06	.41	
Maternal education	-.04	.73		-.04	.69	
Childhood SES	.03	.76		.12	.22	
AAI dismissing	--	--		-.10	.18	
AAI preoccupied	-.12	.18		--	--	

Note. $N = 164$. AAI = Adult Attachment Interview. SES = socioeconomic status. For abused/neglected, 1 = abused/neglected, 0 = not abused/neglected. For participant sex, 1 = female, 0 = male. For participant ethnicity, 1 = White/non-Hispanic, 0 = other. Models were significant at $p < .01$ at each step except Step 1, 2, 3 when predicting AAI Dismissing ($p = .36, .28, .27$, respectively).

AAI Preoccupied Attachment States of Mind as a Mediator of the Association between Childhood Abuse/Neglect and NSSI Reported in Adulthood

Table 3

	Total Effect			Direct Effect			Indirect Effect			Effect Size							
c	B	SE	p	c'	B	SE	p	a	B	SE	p	a × b	B	SE	p	κ^2	I/T
Mediator: AAI preoccupation at age 19 years																	
Abuse or neglect	.28	.06	<.01	.19	.06	<.01	.30	.07	<.01	.27	.09	<.01	.08	.03	.01	.06	28.6%
Mediator: AAI preoccupation at age 26 years																	
Abuse or neglect	.28	.06	<.01	.22	.06	<.01	.23	.07	<.01	.26	.09	<.01	.06	.03	.02	.07	21.4%

Note. N = 164. Standardized regression coefficients are presented. Abuse or neglect, 1 = abused/neglected, 0 = not abused/neglected. Covariates included child sex, child ethnicity, childhood SES, and childhood maternal education.

I/T = Indirect/Total effect.