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The role of parental psychopathology and personality in adolescent non-suicidal self-injury

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Abstract

Adolescent non-suicidal self-injury (NSSI), a significant risk factor for suicidal behavior, is strongly associated with adolescent psychopathology and personality traits, particularly those characterized by poor self-regulation. Some parental psychopathology and personality traits have also been identified as risk factors for adolescent NSSI, but specific parental characteristics and mechanisms involved in this association have not been systematically examined. The current study comprehensively investigated the contribution of parental psychopathology and personality to adolescent NSSI using data from the baseline wave of the Adolescent Development of Emotion and Personality Traits (ADEPT) study of 550 adolescent girls (mean age=14.39 years, SD=0.63) and their biological parents. We first investigated whether parental lifetime psychiatric diagnoses, and personality and clinical (rumination, self-criticism, emotional reliance) traits were associated with adolescent NSSI. We also tested whether adolescent history of psychiatric illness, personality, and clinical traits mediated the associations between parental characteristics and adolescent NSSI. Parental substance use disorder, adult-ADHD symptoms, self-criticism, and lower agreeableness and conscientiousness were associated with offspring's NSSI. These associations were mediated through adolescent characteristics. In contrast, parental mood and anxiety disorders and neuroticism were unrelated to adolescent NSSI. The results suggest that parental traits and disorders characterized by self-regulatory difficulties and lack of support constitute risk factors for self-injury in adolescent girls, acting via adolescent traits. This demonstrates that parental influences play a significant role in the etiology of adolescent NSSI.

Keywords

ADHD; adolescence; non-suicidal self-injury; personality; self-criticism

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Non-suicidal self-injury (NSSI), the direct, deliberate destruction of one's own body tissue with the absence of the intent to die, constitutes one of the strongest predictors of future suicidality in adolescents (Asarnow, et al., 2011; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Prinstein, et al., 2008), a leading cause of death in young people (World Health Organization, 2012). NSSI is also associated with high levels of functional impairment (Selby, Bender, Gordon, Nock, & Joiner Jr, 2012) and distress (Baetens, Claes, Willem, Muehlenkamp, & Bijttebier, 2011; Hasking, et al., 2010; Hilt, Cha, & Nolen-Hoeksema, 2008). NSSI occurs cross-culturally in both clinical and community populations, with particularly high rates of approximately 14–30% in adolescents (Brunner, et al., 2007; Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012; Muehlenkamp, Claes, Havertape, & Plener, 2012). Given the clinical importance and high prevalence of NSSI in youth, it is imperative to understand its risk factors to guide treatment and prevention approaches.

Adolescent characteristics and NSSI

Converging evidence suggests that individuals who self-injure exhibit a range of characteristics underpinned by self-regulation difficulties, such as deficits in inhibitory control, difficulty delaying actions needed to plan and follow through with tasks, and experience of urgency of actions resulting in rash decisions when faced with negative emotions (Glenn & Klonsky, 2010). This self-regulation deficit may account for why NSSI occurs at high rates across a number of different disorders (i.e. ADHD, substance use and personality disorders) (Klonsky, Oltmanns, & Turkheimer, 2003) and may also be expressed through personality dimensions, such as high levels of neuroticism and low conscientiousness (McCrae & Löckenhoff, 2010), which are also associated with NSSI (Berlin & Rolls, 2004; Hasking, et al., 2010; Kiekens, et al., 2015). These low self-regulation traits are also relevant in young people, for example Baetens et al. (2011) found that self-injurious adolescents scored higher on negative affectivity and lower on effortful control compared to adolescents who did not engage in NSSI. Furthermore, several clinical traits linked to NSSI are characterized by poor emotion regulation, including self-criticism (a negative evaluation of the self and recurrent feelings of inadequacy and self-doubt; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Wedig & Nock, 2007), rumination (repetitive, negative reflections about the past events and experiences, Hilt, Cha, & Nolen-Hoeksema, 2008; Hoff & Muehlenkamp, 2009), emotional dependency (Bolognini, Plancherel, Laget, Stéphan, & Halfon, 2003), and excessive reassurance seeking (Hankin & Abela, 2011).

Parent characteristics and adolescent NSSI

Parental characteristics may contribute to the risk for child NSSI (Arbuthnott & Lewis, 2015; Bureau, et al., 2010; Johnson, et al., 2002; Singh, et al., 2006). Extant research suggests that parental depressive symptoms (Hankin & Abela, 2011; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011), distress (Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011), criticism (Hoff & Muehlenkamp, 2009; Yates, Tracy, & Luthar, 2008), and expressed emotion (Wedig & Nock, 2007) are risk factors for adolescent NSSI. However, to our knowledge, no study to date has investigated which parental personality traits are

involved in adolescent NSSI, and studies of parental psychopathology have not been comprehensive.

Links between adolescent and parent characteristics in adolescent NSSI

In addition to identifying parental risk factors for offspring's NSSI, it is also valuable to study mechanisms that elucidate *how* this risk is propagated. One question is whether parental characteristics affect risk for NSSI by influencing their adolescent's own personality and psychopathology, or through separate mechanisms that do not affect the adolescent's characteristics. If the former, it remains unclear whether risk transmission is homotypic (corresponding parent and child characteristic, e.g. parent neuroticism influencing child neuroticism) or heterotypic (different parent and child characteristic, e.g. parent self-criticism influencing child neuroticism). There is clear evidence of homotypic transmission of psychopathology and personality from parents to children (Eley, et al., 2015; Kitamura, et al., 2009; Starr, Conway, Hammen, & Brennan, 2014). With regard to heterotypic transmission, parental low agreeableness has been linked to high neuroticism in offspring, and parental self-criticism with offspring neuroticism (Coplan, Reichel, & Rowan, 2009; Pesonen et al., 2006). Also, indirect evidence suggests that parental ADHD may be associated with low adolescent conscientiousness (Miller, Miller, Newcorn, & Halperin, 2008; Parker, Majeski, & Collin, 2004). Thus, it is plausible that parental psychopathology and personality are risk factors for adolescent NSSI via their effects on the adolescent's own characteristics.

Current study

The present study had two aims. First, it sought to comprehensively identify parental risk factors for NSSI in adolescent girls. Specifically, we compared a broad array of psychopathology, personality and clinical traits in parents of adolescents with and without NSSI. We hypothesized that we would find higher rates of psychopathology in parents of adolescents with NSSI, especially disorders involving disinhibition and poor self-regulation, such as ADHD. We also hypothesized that parents of adolescents with NSSI would exhibit personality profiles similar to those in people engaging in NSSI, namely, low conscientiousness and agreeableness, high neuroticism, self-criticism, rumination and dependency.

In addition, we aimed to test whether parental risk for adolescent NSSI is conveyed via adolescents' own characteristics (psychopathology, personality and clinical traits). We hypothesized that the relationship between parental characteristics and NSSI would be mediated by the corresponding adolescent characteristics (homotypic mechanisms). We also tentatively hypothesized that we would observe some heterotypic links, with adolescent traits most relevant to NSSI – neuroticism and conscientiousness – mediating a broader range of associations between parental characteristics and adolescent NSSI.

Method

Participants

Data was taken from the baseline assessment of the prospective longitudinal Adolescent Development of Emotions and Personality Traits (ADEPT) study at Stony Brook University. The ADEPT cohort consists of 550 adolescent females (13–15 years, $M=14.39$, $SD=0.63$, 88.5% Caucasian) recruited from the vicinity of Stony Brook University. Participants were recruited from commercially available phone lists ($N=338$; 62%), referrals by other participants and community advertisements ($N=199$; 36%), and school presentations ($N=13$; 2%). One biological parent also participated in the study ($N=511$ mothers, 39 fathers, age range=31–64 years, $M=46.48$ years ($SD=4.67$)). Families were financially compensated for their participation. Exclusion criteria were a lifetime history of MDD or dysthymia, an intellectual disability, inability to read and understand questionnaires, or lack of fluency in English in the offspring, or an absence of a biological parent willing to participate. Both adolescents and parents provided informed consent and the study received approval by the Committee on Research Involving Human Subjects (CORIHS) of Stony Brook University's Internal Review Board.

Measures

Adolescent non-suicidal self-injury (NSSI)—Non-suicidal self-injury (NSSI) was assessed by trained interviewers under the supervision of three clinical psychologists (R.K., G.P., D.N.K.) using items 1–7 from the behaviors section of the Inventory of Statements About Self-Injury (ISAS; Klonsky & Olino, 2008), adapted from self-report to interview questions. The ISAS has previously been used to assess NSSI in adolescents (Glenn & Klonsky, 2013) and self-report items from the ISAS have previously been adapted to interview (Klonsky, 2011). The interview inquired about 12 NSSI behaviors performed “intentionally and without suicidal intent”: banging/hitting self, biting, burning, carving, cutting, wound picking, needle-sticking, pinching, hair pulling, rubbing skin against rough surfaces, severe scratching, and swallowing chemicals. When a behavior was endorsed, the interviewer asked follow-up questions to gauge intentionality and suicide intent. Instances of suicidal intent were not counted towards NSSI. When endorsed, participants were asked to estimate the number of instances, age of onset and other characteristics of these behaviors. The behavioral scales have demonstrated good reliability and validity (Klonsky & Glenn, 2009), and have been used in both adult samples (Glenn & Klonsky, 2010) and adolescent samples (Glenn & Klonsky, 2013). For the purposes of this study, a participant was considered to be a member of the NSSI group (NSSI+) if any NSSI was endorsed. All other participants were considered members of the comparison group (NSSI-).

Psychopathology—Participating parents' lifetime psychopathology was assessed using the Structured Interview for the DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1997) modified to include lifetime dysthymia and lifetime generalized anxiety disorder. The assessment was administered by trained interviewers under the close supervision of experienced clinical psychologists (R.K., G.P., and D.N.K.). Inter-rater reliability estimates of 25 SCID recordings were found to be excellent [κ range: 0.69 (specific phobia) to 1.00 (panic disorder)].

Participating parents also completed the 18-item Adult ADHD Self-Report Scale (ASRS; Kessler, et al., 2005). Each item reflects a DSM-IV-TR symptom of ADHD (e.g. “How often are you distracted by activity or noise around you?”, “How often do you feel restless or fidgety?”, etc.). Participants were asked to report their experiences in the past 6 months using a Likert scale ranging from 1 (Never) to 5 (Very Often). This scale has good reliability and validity (Kessler, et al., 2007) and demonstrated good reliability in our sample ($\alpha=0.89$).

In order to collect data on lifetime psychopathology in the non-participating biological parent, the participating biological parent was interviewed using the Family History Screen (FHS; Weissman, et al., 2000). The screen was modified to include symptoms of anorexia, bulimia, and binge-eating disorders. The assessment was administered by trained interviewers under the supervision of experienced psychologists.

Adolescent psychopathology was assessed with the Kiddie Scheduled for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Version (KSADS-PL; Kaufman, Birmaher, Brent, Rao, & Ryan, 1996). This semi-structured diagnostic interview assesses current and lifetime DSM-IV diagnoses. It was conducted by extensively trained research staff under the supervision of three clinical psychologists (R.K., G.P., & D.N.K.). The KSADS-PL has excellent reliability and validity in diagnosing adolescent psychopathology (Kaufman, et al., 1997). Inter-rater reliability estimates of 25 KSADS recordings were found to be excellent (ICC=0.90). The current study focuses only on K-SADS diagnoses of ADHD, because only ADHD diagnosis in parents was significantly related to adolescent NSSI.

Personality—Adolescents and parents completed the Big Five Inventory (BFI), a 44-item self-report questionnaire (John, Eileen, & Kentle, 1991). Participants were asked to describe how they see themselves by agreeing or disagreeing with statements using a Likert scale ranging from 1 (Disagree Strongly) to 5 (Agree Strongly). The BFI measures five personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness to new experiences. This measure is commonly used to assess personality in adults and adolescents (Soto, John, Gosling, & Potter, 2011) and demonstrates good reliability and validity (John & Srivastava, 1999), including in our sample (adolescent $\alpha=.72-83$, parent $\alpha=.74-84$).

Clinical traits—Self-criticism was assessed using the 9-item Self-Criticism scale from the short version of Depressive Experiences Questionnaire (DEQ; Blatt, D’Afflitti, & Quinlan, 1976; Bagby, Parker, Joffe, & Buis, 1994). Both parents and adolescents were asked to describe, on a Likert scale of 1 (Disagree Strongly) to 5 (Agree Strongly), whether they endorse statements such as “I often find that I don’t live up to my own standards or ideals.” The scale has demonstrated good test-retest stability and internal consistency and has been used in both adult and adolescent samples (Klein, 1989), demonstrating very good reliability in our sample (adolescent $\alpha=0.86$, parent $\alpha=0.86$).

Dependency was assessed in both parents and adolescents using the 9-item short version of the Interpersonal Dependency Inventory’s Emotional Reliance scale (IDI; Hirschfeld, et al., 1977; Yaroslavsky, Pettit, Lewinsohn, Seeley, & Roberts, 2013). It measures the need to be

emotionally supported by others. The IDI has been used in both adults (Ryan, La Guardia, Solky-Butzel, Chirkov, & Kim, 2005) and adolescents (Marton & Kutcher, 1995). The scale consists of 9 items rated on a Likert scale of 1 (Not Characteristic of Me) to 4 (Very Characteristic of Me), (e.g. “Disapproval by someone I care about is very painful for me.”). This measure has demonstrated very good reliability and validity (Bornstein, 1994), including in our sample (adolescent and parent $\alpha=0.86$).

Rumination was assessed in both parents and adolescents using the Ruminative Responses Scale (RRS) of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema, 1987). The RRS has been utilized in both adult (Nolen-Hoeksema, Larson, & Grayson, 1999) and adolescent samples (Burwell & Shirk, 2007). This 22-item questionnaire asked participants to indicate how often they experience different thoughts and behaviors when feeling sad using a Likert scale of 1 (Almost Never) to 4 (Almost Always), (e.g. “You think about how alone you feel.”). It has demonstrated good reliability and validity (Treyner, Gonzalez, & Nolen-Hoeksema, 2003) and had excellent reliability in our sample (adolescent $\alpha=0.95$, parent $\alpha=0.94$).

Data Analysis

Descriptive statistics are reported for the primary study variables. Bivariate analyses were used to examine the associations between NSSI and external correlates. In instances in which parental characteristics (personality or psychopathology) correlated with adolescent NSSI, we conducted mediational analyses in Mplus, with bootstrapping used to obtain confidence intervals (Preacher & Hayes, 2004; Preacher & Leonardelli, 2006; Sobel, 1982). We tested for homotypic mediation for all significantly correlated parental characteristics. Additionally, we tested for specific heterotypic mediation mechanisms. We tested whether adolescent neuroticism, which has been shown to be highly associated with NSSI, mediates the association between parent agreeableness and self-criticism, and adolescent NSSI. Furthermore, we tested whether adolescent conscientiousness mediates the association between parent ADHD and adolescent NSSI, given the strong association between ADHD and conscientiousness highlighted in previous research.

Results

NSSI in present sample

Overall, 7.82% participants (43/550) endorsed ever having engaged in NSSI behaviors, 20.93% (9/43) of whom self-injured in the last month. Most (34/43; 79.07%) self-injurers engaged in one type of NSSI behavior and the most common preferred type of self-harm was cutting (23/43; 53.49%). Of self-injurers who provided information about their NSSI frequency, nearly half (19/41; 46.3%) reported 5 or more incidents of NSSI, 29.3% (12/41) reported 2–4 incidents of NSSI, and 24.4% (10/41) reported a single NSSI incident. Individuals with a single incident of NSSI did not differ significantly from those with 2 or more incidents on any of the variables presented in this paper. The mean age of onset was 12.34 ($SD=1.51$). The items corresponding to “biting,” “interfering with wound healing,” “rubbing skin against a rough surface,” “sticking self with needles,” and “swallowing dangerous substances” were not endorsed by any participant as a preferred type of self-harm.

Self-injurers most commonly reported engaging in NSSI when alone (33/43; 86.8%), within an hour of experiencing the urge to self-injure (26/43; 72.2%), and having a desire to quit self-injuring (26/43; 68.4%). Approximately half (19/43; 51.4%) of the NSSI group reported experiencing pain while self-injuring.

Table 1 details the descriptive characteristics of the NSSI group versus non-NSSI group. The groups were comparable on all characteristics, including adolescent and parental age, ethnicity, home composition, socioeconomic status, and maternal education.

Parental Characteristics and NSSI

In Table 2, rates of parental psychiatric diagnoses are presented by group. Compared to parents of girls who did not report NSSI, parents of girls who engaged in NSSI reported more symptoms of ADHD and endorsed higher rates of alcohol use disorders. Additionally, fathers of girls who self-injured were more likely to have any substance use disorder. In contrast, rates did not differ between groups for any depressive disorder, any anxiety disorder, any eating disorder, and any illicit drug use.

Table 3 describes parental personality by group. Relative to parents of girls who did not report NSSI, parents of girls who reported NSSI reported lower agreeableness, lower conscientiousness, and higher self-criticism. Extraversion, neuroticism, openness, dependency, and rumination were comparable in the two groups. Additional analyses revealed that excluding individuals with a single NSSI episode did not change the results in a way that would alter the interpretation.

Mediation Effects

In Figures 1 and 2, we present the results of mediation tests to better understand the links between parental characteristics that were associated with adolescent characteristics and NSSI. Mediation analysis could not be conducted for parental substance use disorders because rates in adolescents was too low ($N=1/550$). Homotypic mediation analyses revealed that adolescent conscientiousness mediated the inverse relationship between parental conscientiousness and NSSI (Figure 1b) and adolescent self-criticism mediated the positive relationship between parental self-criticism and NSSI (Figure 1d). Adolescent agreeableness did not mediate the inverse relationship between parental agreeableness and NSSI (Figure 1a), nor did adolescent ADHD mediate the positive relationship between parental ADHD symptoms and NSSI (Figure 1c).

Heterotypic mediation analyses revealed that adolescent neuroticism mediated the inverse relationship between parental agreeableness and NSSI (Figure 2a) and the positive relationship between parental self-criticism and NSSI (Figure 2b). To better understand the combined role of adolescent neuroticism and self-criticism in the link between parental self-criticism and adolescent NSSI, both adolescent traits were included as mediators together, and were found to independently mediate the positive relationship between parental self-criticism and NSSI (Figure 2d). Finally, adolescent conscientiousness mediated the positive relationship between parental ADHD and NSSI (Figure 2c). A conceptual summary of all significant findings is also presented in Figure 3 for illustrative purposes. It should be noted

that we were underpowered to detect direct effects below .21 and indirect effects below .05, therefore weaker effects may be present.

Discussion

To our knowledge, this is the first study to comprehensively examine the role of parental psychopathology, personality, and other clinical traits in adolescent NSSI, and their associations with adolescent characteristics. We found that girls who self-injure were more likely to have parents with symptoms of ADHD, lower agreeableness and conscientiousness, and higher self-criticism, as well as fathers with substance abuse disorders. We also found that the positive relationship between parental self-criticism and NSSI was mediated by adolescent self-criticism, and the inverse relationship between parental conscientiousness and NSSI was mediated by adolescent conscientiousness. Additionally, our findings suggest a unique role of adolescent neuroticism, which mediated the inverse relationship between parental agreeableness and NSSI, as well as the positive relationship between parental self-criticism and NSSI. Additionally, adolescent conscientiousness mediated the association between higher parental ADHD symptoms and adolescent NSSI.

Parental psychopathology and adolescent NSSI

The findings that parental ADHD and paternal substance abuse are positively associated with adolescent NSSI have not been reported before, but are consistent with previous research suggesting that these problems share deficits in self-regulation and impulsivity that also characterize NSSI (Moeller et al., 2001). We found that adolescent conscientiousness, but not adolescent ADHD symptoms, mediated the association between higher parental ADHD symptoms and adolescent NSSI. The heterotypic mediation is in line with the strong links between ADHD and conscientiousness, which overlap in self-regulation difficulties (McCrae & Löckenhoff, 2010; Barkley, 1997), with lower conscientiousness identified as the most powerful personality predictor for adult ADHD inattention symptoms (Parker, Majeski, & Collin, 2004). The lack of homotypic mediation of the parental ADHD risk factor is in line with recent evidence suggesting different etiologies for adult and child ADHD (Moffitt, et al., 2015). The former was found to be associated with higher rates of conduct and anxiety disorders, while the latter was associated with higher rates of cognitive deficits. Furthermore, parental ADHD was assessed with self-report data while adolescent ADHD was assessed with a clinical interview, which may also, in part, account for the lack of homotypic mediation.

We did not find other parental psychopathology risk factors for adolescent NSSI. Previous studies reported mixed findings regarding a link between higher rates of parental depression and adolescent self-injury. Hankin & Abela (2011) found that parental past depression was a distal risk factor for child NSSI, however this study relied on questionnaire reports of NSSI and had a relatively small sample. Our findings are more consistent with Wilkinson et al. (2011), who found that parental internalizing psychopathology was not linked to adolescent NSSI. Some past research has also identified a positive association between eating disorder symptoms and NSSI (Whitlock, Eckenrode, & Silverman, 2006). We found that self-injuring adolescents were somewhat more likely to have a parent with an eating disorder, but this

effect did not reach statistical significance, perhaps due to the low number of eating disorders in the parents in our sample.

Parental personality and adolescent NSSI

We found that adolescents who engaged in NSSI had parents with lower levels of conscientiousness and agreeableness. Although no study to date has investigated parental personality traits implicated in adolescent NSSI, a similar personality profile was observed in adolescents who self-injure (Berlin & Rolls, 2004; Hasking, et al., 2010; Kiekens et al., 2015). Our findings also suggest that adolescent conscientiousness fully mediated the inverse association between parental conscientiousness and adolescent NSSI, further supporting the pattern of findings indicating that parental personality traits underpinned by poor self-regulation are transmitted to adolescents, increasing the risk of NSSI.

Our finding that adolescents who engaged in NSSI were more likely to have disagreeable parents fits with prior research highlighting the importance of less parental support as a risk factor for NSSI (Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Prinzie, Stams, Dekovi, Reijntjes, & Belsky, 2009). This pathway did not operate through adolescent agreeableness, but instead through adolescent neuroticism. Disagreeable parents may lack the ability to provide parental support and validation, which is especially important during the transitional period of adolescence (Bell & Bell, 1983; Miller, Glinski, Woodberry, Mitchell, & Indik, 2002; Sim, Adrian, Zeman, Cassano, & Friedrich, 2009; You & Leung, 2012), and may increase risk of NSSI as adolescents turn to maladaptive means of emotion regulation including self-injurious behavior (Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Brown, Comtois & Linehan, 2002; Hasking et al., 2010; Nock, 2009). Of particular interest, although previous studies found that high levels of neuroticism are associated with one's own NSSI (Berlin & Rolls, 2004; Hasking, et al., 2010), we did not find it to be a parental risk factor for adolescent NSSI, perhaps because previous studies were conducted in less generalizable samples.

Parental self-criticism and adolescent NSSI

We also found that higher parental self-criticism was a risk factor for adolescent NSSI, which is in line with previous studies linking self-criticism and NSSI within individuals (Hoff & Muehlenkamp, 2009; Yates, Tracy, & Luthar, 2008). This positive relationship was mediated by adolescent traits of self-criticism as well as neuroticism. Adolescents may acquire self-critical views from their parents, which in turn is an important risk factor for the likelihood of their engagement in NSSI, likely as a means of temporarily decreasing the emotional dysregulation associated with these negative self-views (Nock, 2009). Furthermore, parental self-criticism might be influencing adolescent neuroticism—which in turn leads to adolescent NSSI—perhaps due to highly self-critical parents being more restrictive and absorbed with their own thoughts and feelings, resulting in their child's difficulty to relate to them (Beebe, et al., 2007) and overall lower levels of support. Finally, although past literature has highlighted within-individual associations between self-injury and other clinical traits such as rumination (Hilt, Cha, & Nolen-Hoeksema, 2008; Hoff & Muehlenkamp, 2009; Wedig & Nock, 2007) and dependency (Bolognini, Plancherel, Laget,

Stéphan, & Halfon, 2003), these parental characteristics were not significantly related to adolescent NSSI.

Clinical implications

Our findings support the view that faulty self-regulation may play a role in NSSI and suggest that parental characteristics contribute to the development of this vulnerability. This is consistent with treatment approaches, such as Dialectical Behavior Therapy (DBT), that focus on emotional and behavioral dysregulation, and provide skills training groups for parents and adolescents where members learn how to feel more in control of their emotional responses and behaviors and where parents learn how to support and validate their child's emotional experiences (Dimeff & Linehan, 2001). This therapy is commonly used in adolescents engaging in NSSI (Katz, Cox, Gunasekara, & Miller, 2004) and the current results are in line with this clinical approach. Multisystemic Therapy (MST) is another relevant approach, as it focuses on identifying and treating factors in an adolescent's environment that perpetuate and/or maintain problematic behavior with an emphasis on the family system, and has been used to target NSSI (Henggeler, 2012; Huey, et al., 2004).

Limitations

The current study has several strengths, including a large sample and measures capturing a broad range of psychopathology, personality and other clinical characteristics. Nonetheless, several limitations were notable. First, the study involved only adolescent females. There are much higher rates of self-injury in females than in males (Madge, et al., 2008), nonetheless future research should examine these pathways in similarly-aged males in order to investigate the generalizability of our findings. Second, as is commonly the case, most participating parents were mothers. However, reports of co-parent psychopathology were collected with validated measures. Follow up studies should examine these relationships using direct assessment of fathers. Third, our participants came from a relatively healthy community sample (e.g. no lifetime depression), somewhat limiting the extent to which the results apply to a clinical population. This might have led to fewer cases of self-injury, making the link between parent psychopathology more difficult to detect. However, our NSSI prevalence rates were in line with other community studies of adolescents, suggesting that the current results are generalizable to other healthy community samples. Future studies should investigate these associations in clinical populations. Fourth, our study did not assess parental NSSI, which could be a useful predictor of adolescent NSSI. Future family studies should investigate this possibility. Fifth, the timing of the assessment of mediators and NSSI was not always sequential, such that engagement in NSSI may have altered personality, inflating the observed effects. These analyses should be replicated in a longitudinal study with assessment of potential mediators preceding onset of NSSI. Sixth, our study is not capable of determining whether the mediation effects found are due to heritability of these traits and/or environmental influences. Twin studies should be utilized to address this question. Lastly, due to the low prevalence of NSSI in our population-based sample we were unable to further divide our NSSI group to explore whether differences in NSSI frequency or preferred method of self-injury would be associated with different vulnerabilities. However, exclusion of individuals with a single NSSI episode did not change the results in a way that would alter the interpretation. Future studies should examine the effects of NSSI frequency

in more detail and use DSM-5 criteria for Nonsuicidal Self-Injury Disorder to enhance clinical value of these results.

Conclusions

The current study is the first to systematically examine parental risk factors for adolescent NSSI. We found that self-critical parents and those with psychopathology and personality traits broadly suggestive of poor self-regulation and low support increase the risk of daughters' self-injury. Furthermore, these characteristics were mediated through the adolescents' own traits, indicating that parental risk factors for NSSI are transmitted via child personality and self-criticism. This suggests that parents' traits play an important role in the etiology of adolescent NSSI, and may inform the development and implementation of clinical interventions for self-injury.

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Figure 1.

Figure 2.

Figure 3.

Table 1

Demographic description of NSSI vs Non-NSSI

	<u>NSSI (n= 43)</u>		<u>Non-NSSI (n = 507)</u>	
	M	SD	M	SD
Age of Adolescent	13.91	0.81	13.84	0.71
Age of Participating Parent	45.79	4.79	46.54	4.67
	N	%	N	%
Caucasian	38	88.4	444	87.6
Hispanic	8	18.6	52	11.4
Both Parents In Home	34	79.1	437	86.2
Mother Participant	39	90.6	472	93.1
Annual Household Income				
Less than \$60,000	7	17.1	57	12.4
\$60,000 – \$120,000	19	46.3	184	40.1
\$120,000 or more	15	36.6	218	47.5
Participating Parent has	17	39.5	269	53.1
Bachelors or higher				

Note: Some categories do not contain complete information for some participants due to missing data. No significant differences existed between groups. However, fathers of girls who reported NSSI were disproportionately less likely to complete college than fathers of girls who did not engage in NSSI [$p=.01$, Odds Ratio=0.41, (CI .20, .82)].

Table 2

Description of Parent Psychopathology in NSSI vs. non-NSSI

Parent Diagnosis [†]	NSSI			Non-NSSI			Chi Square	Odds Ratio	Confidence Intervals	
	N	%		N	%				UL ^{††}	LL
Any Dep ^{†††}	18	41.86	169	33.33			1.28	1.44	0.76	2.71
Mother	9	20.93	106	20.91			0.00	1.00	0.47	2.15
Father	12	27.91	93	18.34			2.35	1.72	0.85	3.48
Any Anx	23	53.49	235	46.35			0.81	1.33	0.71	2.49
Mother	19	44.19	206	40.63			0.21	1.16	0.62	2.17
Father	8	18.6	59	11.64			1.80	1.74	0.77	3.92
Any Eating	5	11.63	28	5.52			2.62	2.25	0.82	6.16
Mother	2	4.65	19	3.74			0.09	1.25	0.28	5.57
Father	3	6.98	11	2.17			3.69	3.38	0.91	12.62
Any Sub	16	37.21	135	26.63			2.23	1.63	0.85	3.13
Mother	7	16.28	63	12.43			0.53	1.37	0.59	3.21
Father	15	34.88	98	19.33			5.88*	2.24	1.15	4.35
Any Drug	6	14.0	56	11.0			0.34	1.31	0.53	3.23
Any Alc	18	41.9	125	24.7			6.10*	2.20	1.16	4.17
M	SD		M	SD			<i>t</i>	<i>p</i>	<i>d</i>	
Adult ADHD	2.44	0.56	2.20	0.53			-2.86	0.00**	0.44	

Note: NSSI N=43, Non-NSSI N=507.

[†]Diagnoses derived from SCID and FHS. Any Drug, Any Alcohol, and Adult ADHD are only available from SCID data. Only self-report measures from the participating parent were used to determine adult ADHD severity.^{††}UL=Upper Limit, LL=Lower Limit.^{†††}Diagnoses were combined to create overall scores of each parental psychopathology, which reflected whether at least one (score '1') or none (score '0') of the parents were diagnosed with each disorder. Only SCID ratings were used to determine any drug and any alcohol use disorders in the combined score of substance use.Cohen's *d* compares a mean difference in scores between NSSI and non-NSSI groups. *d*=0.20-0.49 is indicative of a small effect size, *d*=0.50-0.80 is a medium effect size and *d*>0.80 is a large effect size.* *p*<.05,** *p*<.01

Table 3

Description of Parent Personality and Clinical traits in NSSI vs. non-NSSI

Personality Measure	NSSI		Non-NSSI		<i>t</i>	<i>p</i>	<i>d</i>
	M	SD	M	SD			
BFI							
Extraversion	3.46	0.80	3.58	0.79	-0.99	0.32	0.15
Agreeableness	4.06	0.63	4.26	0.51	-2.43	0.02*	0.35
Conscientiousness	3.91	0.74	4.19	0.60	-2.37	0.02*	0.42
Neuroticism	2.80	0.86	2.60	0.82	1.52	0.13	-0.24
Openness	3.56	0.68	3.64	0.72	-0.73	0.46	0.11
Self Criticism	2.38	0.87	2.05	0.84	2.48	0.01*	-0.39
Dependency Scale	2.03	0.70	1.86	0.62	1.71	0.09	-0.26
Rumination	1.62	0.57	1.53	0.49	1.15	0.25	-0.17

Note: NSSI N=43, Non-NSSI N=507.Cohen's *d* compares a mean difference in scores between NSSI and non-NSSI groups. $d=0.20-0.49$ is indicative of a small effect size, $d=0.50-0.80$ is a medium effect size and $d>0.80$ is a large effect size.* $p<.05$