

**Non-Suicidal Self-Injury in Pediatric Bipolar Disorder: Clinical Correlates and
Impact on Psychosocial Treatment Outcomes**

Abstract

Non-suicidal self-injury (NSSI) in childhood is not well documented, especially among youth with pediatric bipolar disorder (PBD). The current study evaluated prevalence and correlates of NSSI, and its impact on intervention response, in a randomized trial of Child- and Family-Focused Cognitive-Behavioral Therapy (CFF-CBT) versus Treatment As Usual (TAU), adjunctive to pharmacotherapy. This study included 72 children ages 7-13 (58% male) with PBD. NSSI and correlates were assessed at baseline; mood and psychiatric severity were measured longitudinally. NSSI was common: 31% endorsed NSSI behaviors; 10% reported thoughts of NSSI, in the absence of behaviors. Children engaging in NSSI reported higher depression, psychosis, suicidality, and hopelessness; lower self-esteem; and reduced family help-seeking in univariate analyses. In a multivariate logistic regression, high child depression and psychosis, and low family help-seeking, remained significantly associated with baseline NSSI. In mixed-effects regression models, presence of NSSI at baseline did not influence the response of depressive symptoms to treatment. Children who endorsed NSSI experienced steeper response trajectories for psychiatric severity, regardless of treatment group. Youth who denied NSSI showed poorer response to TAU for manic symptoms; mania trajectories in CFF-CBT were similar across youth. Thus, NSSI in PBD is common and associated with impairment. As children might engage in NSSI for different reasons, the function of NSSI should be considered in treatment. Since children without NSSI fared worse in TAU, it may be important to ensure that youth with PBD receive structured, intensive interventions. CFF-CBT was efficacious regardless of NSSI, and thus shows promise for high-risk children with PBD.

Keywords: non-suicidal self-injury; pediatric bipolar disorder; cognitive-behavioral therapy; randomized controlled trial; treatment response

Non-Suicidal Self-Injury in Pediatric Bipolar Disorder: Clinical Correlates and Impact on Psychosocial Treatment Outcomes

Pediatric Bipolar Disorder

Pediatric bipolar disorder (PBD) is a serious condition associated with significant morbidity and mortality. PBD affects approximately 1-2% of children and adolescents (Van Meter, Moreira, & Youngstrom, 2011). Compared to adults with bipolar disorder, youth with PBD spend more time symptomatic with mixed depressive and manic presentations, rapid mood fluctuations, and subthreshold symptoms (Birmaher et al., 2009; Geller, Tillman, Bolhofner, & Zimmerman, 2008). Early-onset of bipolar disorder is also associated with greater functional impairment and poorer quality of life (Perlis et al., 2009). In addition, youth with PBD often present with psychotic features and psychiatric comorbidity (Birmaher et al., 2009; Geller et al., 2008; Van Meter, Burke, Kowatch, Findling, & Youngstrom, 2016), psychosocial impairment (Goldstein et al., 2009), and familial dysfunction (Keenan-Miller, Peris, Axelson, Kowatch, & Miklowitz, 2012).

Importantly, these children and adolescents are at increased risk for suicide. According to a recent systematic review calculating weighted mean prevalence rates across 13 studies ($N=1,508$), 50-60% of youth with PBD report suicidal ideation (SI), and 20-25% attempt suicide (Hauser, Galling, & Correll, 2013). Findings from three studies indicate that SI in PBD is associated with Caucasian race, younger age, narrow PBD phenotype (youth with hypomanic or manic episodes, and hallmark symptoms of elevated mood or grandiosity), more severe depressive symptoms, hopelessness, low self-esteem, family rigidity, and poor quality of life (for review see Hauser et al., 2013; Weinstein, Van Meter, Katz, Peters, & West, 2015). In contrast, significant correlates of suicide attempts in PBD reported in 10 studies include female gender, older age, earlier onset of illness, more severe/episodic PBD, mixed episodes, comorbid disorders, prior non-suicidal self-injury (NSSI) and suicidality (SI and attempts), physical/sexual abuse, parental depression, family history of suicidality, and familial dysfunction (for review see Hauser et al., 2013). Thus, youth with PBD represent a high-risk group for which additional research on suicidality and associated predictors is needed.

Non-Suicidal Self-Injury

NSSI, or the deliberate destruction of one's body without suicidal intent (for review see Nock, 2010), is one such correlate that is associated with suicidality in community and clinical samples broadly (for review see Jacobson & Gould, 2007; Stewart et al., 2017), and in PBD specifically. NSSI is more prevalent in youth with PBD who have a history of suicide attempts compared to those who do not (Algorta et al., 2011; Goldstein et al., 2005). NSSI was also more common among youth with PBD who attempted suicide prospectively over 5 years (Goldstein et al., 2012). Interestingly, emerging evidence suggests that NSSI may be a stronger predictor of suicidal behavior than prior attempts in depressed adolescent samples (Asarnow et al., 2011; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011). Thus, the link between NSSI and suicidality is strong and well documented, especially among youth with mood dysregulation. While the exact mechanisms linking NSSI to suicidal behaviors remain unclear, according to the interpersonal theory of suicide, NSSI may facilitate an acquired capability for suicide via habituation to the pain and fear involved in suicide attempts (Joiner, 2005). This theory has recently received empirical support in clinical samples of adolescents (Horton et al., 2016; Stewart et al., 2017).

In addition to being a risk factor for future suicidal behaviors, research suggests that NSSI is a dangerous and distinct phenomenon in its own right (for review see Muehlenkamp, 2005). Prevalence of NSSI in heterogeneous youth samples ranges from 13-23% in the community (for review see Jacobson & Gould, 2007) and 40-60% in clinical settings (for review see Barrocas et al., 2011; DiClemente, Ponton, & Hartley, 1991). In addition to suicidality, NSSI is associated with female sex, peer NSSI, hopelessness, emotion dysregulation, alexithymia, dissociation, internalizing and externalizing psychopathology, borderline personality disorder symptoms, eating disorder symptoms, substance use, and physical/sexual abuse (Fox et al., 2015; for review see Jacobson & Gould, 2007). Regarding functions, youth appear to engage in NSSI for intrapersonal negative reinforcement (to reduce tension or negative emotions), intrapersonal positive reinforcement (to create a desirable physiological state or punish oneself), interpersonal negative reinforcement (to escape interpersonal tasks/demands or stop bullying/fighting), and interpersonal positive reinforcement (to gain attention, support, or access to desired materials; for

review see Nock, 2010; Nock & Prinstein, 2004). Intrapersonal negative reinforcement is the most commonly endorsed function (Nock, Prinstein, & Sterba, 2009).

Although NSSI has received less empirical attention than suicidality, recent research offers improved conceptualization of this behavior in youth. Nevertheless, further investigation is needed. Research with younger, high-risk samples is crucial, as limited work has evaluated NSSI in prepubertal children (for review see Barrocas et al., 2011). Also, early identification and intervention among those predisposed to NSSI may prevent its persistence and the development of suicidality in adolescence and adulthood.

Non-Suicidal Self-Injury in Pediatric Bipolar Disorder

As aforementioned, youth with PBD are at increased risk for both NSSI and suicidality (Algorta et al., 2011; Goldstein et al., 2005; Goldstein et al., 2012). While at least 15 studies have examined either SI or suicide attempts in PBD (for review see Hauser et al., 2013; Weinstein, Van Meter, et al., 2015), to our knowledge, only one study has examined correlates and potential functions of NSSI in PBD. In a sample of 432 youth with PBD, Esposito-Smythers et al. (2010) reported NSSI prevalence of 22% during the most recent mood episode, and a lifetime prevalence of 34-37%. Bipolar I and II disorders, a mixed episode, depression, separation anxiety, psychosis, suicide attempt, and psychosocial dysfunction were associated with NSSI. The authors noted that these correlates were consistent with the functional model of NSSI (for review see Nock, 2010; Nock & Prinstein, 2004). Specifically, they concluded that youth with illness features associated with high or low emotional reactivity (bipolar I or II disorders, mixed episode, depression, psychosis, separation anxiety, suicide attempt) might have engaged in NSSI for intrapersonal negative or positive reinforcement. In contrast, they suggested that youth with psychosocial dysfunction potentially used NSSI for interpersonal negative or positive reinforcement.

Thus, prevalence of NSSI was high in this sample of youth with PBD. In addition, NSSI was associated with unique predictors not commonly documented in heterogeneous community or clinical samples. Therefore, additional research on NSSI in PBD is essential, as it is relatively common, dangerous, and related to suicidality. Better understanding of the subset of youth who engage in these high-risk behaviors also has important clinical implications. Specifically, improved conceptualization of

NSSI can indicate treatment targets, and importantly, signify youth who may be susceptible to NSSI, suicidality, or both.

Impact of Non-Suicidal Self-Injury on Psychosocial Treatment Outcomes

Given increased rates of suicidality and NSSI in youth with mood disorders, and PBD specifically, it is also important to examine whether these deleterious behaviors influence psychosocial intervention response, as such information can inform clinical decisions and treatment planning. However, few studies have examined the impact of these behaviors on treatment outcomes. Limited research suggests that both SI (Asarnow et al., 2009; Curry et al., 2006; Rohde, Seeley, Kaufman, Clarke, & Stice, 2006) and NSSI (Asarnow et al., 2009; Vitiello et al., 2011) are associated with worse outcomes across groups in randomized controlled trials (RCTs) of Cognitive-Behavioral Therapy (CBT) for adolescents with depression. However, one study found evidence of moderation via enhanced response of suicidal, depressed adolescents to CBT versus non-directive-supportive therapy (Barbe, Bridge, Birmaher, Kolko, & Brent, 2004). These results suggest that depressed youth with SI and NSSI generally fare worse in treatment, and thus may require more supports and interventions that target these behaviors directly.

Even less research has examined the predictive and moderating effects of suicidality and NSSI in psychosocial treatments for PBD. One study found that SI did not impact intervention response for PBD (Weinstein, Henry, Katz, Peters, & West, 2015); however, no studies have specifically examined NSSI. As such, more research is needed to better understand the role NSSI plays in intervention response for children with PBD. These insights can signify those who may require therapeutic provisions and specialized treatments for suicidality and NSSI, such as Dialectical Behavior Therapy (Goldstein et al., 2015).

Current Study

Given limited research on NSSI in prepubertal children in general and PBD in particular, and lack of knowledge regarding the impact of NSSI on treatment trajectories, this study aimed to identify correlates of NSSI among children with PBD, and examine the influence of NSSI on psychosocial intervention response. We conducted secondary analyses in an RCT of Child- and Family-Focused CBT (CFF-CBT)

versus Treatment as Usual (TAU) for PBD (West et al., 2014). Results from this RCT demonstrated superiority of CFF-CBT versus TAU for treatment attendance and satisfaction, children's manic and depressive symptoms, and global functioning (West et al., 2014).

Hypotheses were based on findings from aforementioned studies of NSSI in PBD (Esposito-Smythers et al., 2010) and heterogeneous youth samples (Fox et al., 2015; for review see Jacobson & Gould, 2007), and the functional model of NSSI (for review see Nock, 2010; Nock & Prinstein, 2004). Consistent with prior research and the intrapersonal negative and positive reinforcement functions of NSSI, we expected that illness features exacerbating emotion dysregulation (via low or high reactivity) would be correlated with NSSI. Specifically, we hypothesized that children who endorsed NSSI would have higher rates of bipolar I and II disorders and mixed episodes; more severe depression, mania, anxiety, psychosis, and suicidality; higher hopelessness; and lower self-esteem. Also in line with past research and the interpersonal negative and positive reinforcement functions of NSSI, we anticipated that characteristics facilitating social dysfunction would be associated with NSSI. Specifically, we hypothesized that children with NSSI would have higher rates of disruptive behavior disorders, and greater impairment in global functioning, quality of life, and coping skills. Similarly, we hypothesized that parents of children who reported NSSI would have more mood symptoms and deficits in family functioning, coping, and help-seeking. Finally, based on findings from RCTs of CBT for depressed adolescents (Asarnow et al., 2009; Vitiello et al., 2011), and considerable impairment associated with NSSI, we expected that presence of NSSI at baseline would be predictive of worse outcome trajectories across treatment conditions.

Method

Participants

Seventy-two children with PBD and their parents were recruited from a specialty pediatric mood disorders clinic in an urban, Midwestern Academic Medical Center from 2010-2014. Inclusion criteria required children to be ages 7-13 and meet *DSM-IV-TR* criteria for a bipolar spectrum disorder, including bipolar I, II, or not otherwise specified (NOS). Bipolar disorder NOS was defined using *DSM-IV-TR* criteria as the presence of depressive and manic symptoms that met symptom severity threshold but not

minimal duration criteria, or the presence of recurrent hypomanic episodes without intercurrent depressive symptoms. Children were also required to be stabilized on medication, defined as scores of ≤ 20 on the Young Mania Rating Scale (YMRS; Young, Biggs, Ziegler, & Meyer, 1978) and < 80 on the Children's Depression Rating Scale-Revised (CDRS-R; Poznanski et al., 1984). Children were excluded if they had an IQ < 70 ; a primary psychotic disorder, substance abuse/dependence, neurological conditions, or other medical problems that complicated psychiatric symptoms, per the Washington University Kiddie Schedule for Affective Disorders and Schizophrenia (WASH-U-KSADS; Geller et al., 2001); active suicidality requiring hospitalization; and primary caregiver with severe mood symptoms.

Children were 9.22 years old on average ($SD=1.59$) and 58% ($n=42$) were male. Regarding race, 57% ($n=41$) were Caucasian, 31% ($n=22$) were African American, 7% ($n=5$) were Hispanic, 4% ($n=3$) were American Indian or Alaskan Native, and 1% ($n=1$) were "*Other*." Clinical characteristics of the sample are described in the Results.

Procedures

Baseline Diagnosis and Randomization. Procedures were overseen by a University Institutional Review Board. Study personnel completed informed consent/assent, screening, the WASH-U-KSADS (Geller et al., 2001), and the Kiddie SADS-Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997) with parents and children. Interviews were reviewed during study meetings to ascertain consensus diagnoses. Children with PBD subsequently completed the baseline assessment and were randomized to treatment condition. Additional evaluations were conducted at 4-, 8-, 12- (post-treatment), and 39-weeks (6-month follow-up) by blind raters.

Treatment Conditions. Families were randomly assigned to CFF-CBT ($n=35$) via a specialty mood disorders clinic or TAU ($n=36$) via a general psychiatry clinic, both within the same outpatient psychiatry program ($n=1$ excluded with baseline data only). See West et al. (2014) for the Consolidated Standards of Reporting Trials (CONSORT) diagram, additional study details, and primary outcomes. Treatment in both conditions consisted of 12 weekly 60-90 minute sessions and up to six monthly booster sessions.

CFF-CBT is a manualized, family-based intervention that integrates CBT with psychoeducation and complementary mindfulness and interpersonal/family therapy techniques. Family, parent, and child session content is structured around the treatment acronym “RAINBOW,” including: **R**outine (development of consistent routines); **A**ffect Regulation (psychoeducation about emotions; mood monitoring; coping strategies); **I** Can Do It! (improvement in child self-esteem and parent self-efficacy); **N**o Negative Thoughts/Live in the **N**ow (cognitive restructuring and mindfulness to reduce negative thoughts); **B**e a Good Friend/**B**alanced Lifestyle (social skill-building and parent self-care); **O**h How Do We Solve this Problem? (family problem-solving and communication training); and **W**ays to Find Support (enhanced support networks and parental advocacy; Pavuluri, Graczyk, et al., 2004; West et al., 2014).

Though CFF-CBT and TAU sessions were intended to be matched on treatment dosage, more CFF-CBT participants ($n=30$) completed the core treatment (12 weekly sessions) than TAU ($n=17$). However, attrition by the 6-month assessment did not differ by condition. Other than efforts to match number of sessions across conditions, TAU sessions were not manipulated in terms of content or structure. In addition to psychotherapy, all participants received medication management according to an evidence-based algorithm (Pavuluri, Henry, et al., 2004).

Twenty-three therapists, consisting of clinical psychology pre- and post-doctoral trainees novice to treatment of PBD, facilitated CFF-CBT following a 3-hour training on the manual. They also received weekly supervision from the treatment developers. Control therapists ($n=23$) consisted of clinical psychology doctoral trainees, post-doctoral fellows, psychiatry fellows, and social work interns. They received a 1-hour training on PBD symptoms, course, and associated impairments, making this condition “enhanced” compared to typical TAU. Per session audio-recordings coded by trained raters, therapists demonstrated strong fidelity to CFF-CBT (93%), and there was minimal presence of CFF-CBT concepts in TAU (4%; West et al., 2014).

Measures

Diagnoses. The WASH-U-KSADS (Geller et al., 2001) is a semi-structured interview used to assess *DSM-IV* diagnoses, including bipolar spectrum disorders and most recent/current episode. This assessment has well-established reliability and validity. Trained study personnel administered the interview at baseline and demonstrated adequate reliability, $k > .74$.

NSSI. The WASH-U-KSADS (Geller et al., 2001) Non-Suicidal Physical Self-Damaging Acts item was used to evaluate NSSI over the past year at baseline. This item assesses “self-mutilation, or other acts done without intent of killing him/herself” and is rated: 0 (no information); 1 (not present); 2 (slight: has had thoughts about hurting, not killing, him/herself, but has not done so); 3 (mild: infrequent, 1-3 times/year); 4 (moderate: frequent, 4-11 times/year); 5 (severe: very frequent, ≥ 12 times/year); or 6 (at least one non-accidental act which left permanent, substantial damage).

Demographics. The Conners-March Developmental Questionnaire (Conners & March, 1996) assessed children’s age, sex, and race at baseline.

Clinical Characteristics. The clinician-rated Clinical Global Impressions Scale for Bipolar Disorder-Severity Scales (CGI-BP; Spearing, Post, Leverich, Brandt, & Nolen, 1997) assessed overall severity of children’s psychiatric illness longitudinally, and baseline levels of mania, depression, and psychosis. Scores range from 1 (not at all ill) to 7 (extremely ill). The CGI-BP-S has strong inter-rater reliability, and evidenced good reliability in the current study, $ICC = .81$.

The Child Mania Rating Scale (CMRS; Pavuluri, Henry, Devineni, Carbray, & Birmaher, 2006) and companion Child Bipolar Depression Rating Scale (CBDRS; Unpublished Data, August, 2003) assessed children’s mood longitudinally. The CMRS contains 21 items and the CBDRS contains 22 items; both are completed by parents. Responses range from 0 (never/rarely) to 3 (very often); total scores range from 0-63 (CMRS) and 0-66 (CBDRS). The CMRS has good internal consistency, test-retest reliability, and validity (content, construct, criterion). The CBDRS is face valid (consistent with *DSM-IV-TR* criteria for a major depressive episode) and had modest construct validity, as it was significantly correlated with the clinician-rated CDRS-R (Poznanski et al. 1984), $r = .32$, $p < .01$, and the CGI-BP-Severity of Depression

(Spearing et al. 1997), $r=.44$, $p<.01$. In this study, reliability was strong for both the CMRS, $\alpha=.90$, and CBDRS, $\alpha=.88$.

Finally, the clinician-rated Children's Global Assessment Scale (CGAS; Shaffer et al., 1983) measured children's baseline psychosocial functioning. Scores range from 1-100. The CGAS has strong inter-rater reliability, test-retest reliability, and validity (discriminant, concurrent). In the current study, the CGAS had good inter-rater reliability, $ICC=.76$.

Suicidality. The Columbia Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) is a semi-structured interview that evaluated current and lifetime suicidality at baseline. Suicidal behaviors assessed include preparatory acts (acts or preparation toward making a suicide attempt, such as assembling a method, like buying pills), aborted attempts (individual begins to take steps toward making a suicide attempt, but stops him/herself), interrupted attempts (individual is interrupted by someone/something from starting a suicide attempt), and actual suicide attempts (individual commits a potentially life-threatening act, with at least some wish to die). In current analyses, binary variables were created to assess passive/nonspecific ideation versus severe ideation (with a method, intent, and/or plan), and absence versus presence of suicidal behavior (preparatory acts; aborted, interrupted, and actual attempts). The Suicidal Ideation Intensity scale measured intensity of ideation; scores range from 0-25. The C-SSRS has shown good sensitivity and specificity for suicidal ideation and behavior. Reliability was strong in this sample, $\alpha=.88$.

Child Psychosocial Factors. All child measures were self-reports completed at baseline.

The Piers-Harris Self-Concept Scale-2 (PHSCS-2; Piers & Herzberg, 2002) measured children's self-esteem. The PHSCS-2 contains 60 yes/no items that assess attitudes about physical appearance, anxiety, intellectual/school status, behavior, satisfaction, and popularity. Reliability and validity are well established; reliability was excellent in this sample, $\alpha=.90$.

The Hopelessness Scale for Children (HSC; Kazdin, Rodgers, & Colbus, 1986) assessed children's feelings of hopelessness via 17 yes/no items. The HSC has good reliability and validity. Internal consistency in this sample was adequate, $\alpha=.63$.

The Youth Coping Index (YCI; McCubbin, Thompson, & Elver, 1996) measured children's coping. The YCI contains 31 5-point Likert-scale items that evaluate personal development, problem solving, and stress management. The YCI has strong internal consistency, test-retest reliability, and predictive validity; current sample $\alpha=.82$.

Lastly, the Questionnaire for Measuring Health-Related Quality of Life in Children (KINDL; Ravens-Sieberer & Bullinger, 1998) assessed children's quality of life. The KINDL contains 24 5-point Likert-scale items that measure physical, emotional, self-esteem, family, friend, and school domains. The KINDL has good reliability and excellent validity; current sample $\alpha=.75$.

Parent/Family Clinical/Psychosocial Factors. All parent measures were self-reports completed at baseline.

The Beck Depression Inventory–II (BDI-II; Beck, Steer, & Brown, 1996) assessed parents' depressive symptoms. The BDI-II contains 21 3-point Likert-scale items and has good clinical sensitivity, internal consistency, test-retest reliability, and validity; current sample $\alpha=.93$.

The Altman Self-Rating Mania Scale (ASRM; Altman, Hedeker, Peterson, & Davis, 1997) assessed parents' manic symptoms. The ASRM contains five 4-point Likert-scale items and has good reliability, validity, sensitivity, and specificity; current sample $\alpha=.58$.

The Family Adaptability and Cohesion Scale (FACES; Olson, 2011) contains 62 5-point Likert-scale items that measure family functioning, cohesion, and flexibility. The FACES has good internal consistency and validity (concurrent, construct, discriminant); current sample $\alpha=.79$.

Finally, the Family Crisis Oriented Personal Evaluation Scales (FCOPES; McCubbin, Olson, & Larsen, 1991) measured families' coping. The FCOPES contains 39 5-point Likert-scale items and five subscales: social support; spiritual support; positive reframing; acquiring/accepting help; and passive appraisal. The FCOPES has adequate internal consistency and test-retest reliability for the overall scale and subscales, and good factorial and concurrent validity. The current study used the total scale and acquiring/accepting help subscale; both demonstrated adequate reliability, current sample $\alpha=.84$ and $.77$, respectively.

Data Analysis

Frequency counts were conducted to determine prevalence of NSSI. Participants were grouped based on presence/absence of NSSI behaviors, consistent with prior research (Esposito-Smythers et al., 2010). Specifically, youth who endorsed any NSSI behaviors, including mild (infrequent, 1-3 times/year), moderate (frequent, 4-11 times/year), and severe (very frequent, ≥ 12 times/year), were compared against those without NSSI behaviors, including both youth who denied NSSI and those who reported thoughts of NSSI only, in the absence of behaviors. Because we were interested in examining the most severe form of this phenomenon in PBD, we did not group those who reported only thoughts of NSSI with those who endorsed NSSI behaviors.

Preliminary Pearson correlations indicated that both child factors and parent/family variables were moderately correlated with one another, suggesting that these were related but distinct constructs. Differences in child and parent/family demographic, clinical, and psychosocial factors were compared using independent-samples *t*-tests and Chi-square analyses. Given the exploratory nature of this study, the significance level was set at $p < .05$. Significant correlates from univariate findings were subsequently entered into a single multivariate logistic regression model simultaneously, examining associations with presence/absence of NSSI. Only demographic, clinical, and psychosocial variables found to significantly differ across NSSI groups at the univariate level were controlled for in logistic regression analyses.

Exploratory two-level, mixed-effects regression models (MRMs) were used with the intent-to-treat sample to examine the impact of NSSI on PBD dependent variable symptom outcomes (mania, depression, and overall psychiatric severity). As primary outcome analyses indicated a significant difference in mania across groups initially (West et al., 2014), models examining mania trajectories controlled for baseline manic symptom severity. MRMs included effects for Time (centered at 12 weeks), Treatment (coded 1, reflecting post-treatment differences in intercept), NSSI (coded 1), Treatment x Time (group differences in slope through follow-up), Treatment x NSSI (post-treatment differences in intercept by NSSI group), Time x NSSI (NSSI as a predictor of overall slope over time), and Treatment x Time x

NSSI (NSSI as a moderator of treatment slope over time). Models also included random effects for intercept and slope, and linear and quadratic time effects, which were retained when significant.

Results

Prevalence of NSSI

NSSI was common: 31% ($n=22$) endorsed NSSI behaviors over the past year. Of those, 15% ($n=11$) reported mild NSSI, 7% ($n=5$) reported moderate NSSI, and 8% ($n=6$) reported severe NSSI. Additionally, 10% ($n=7$) reported thoughts of NSSI, in the absence of behaviors.

Demographics

The demographic composition of the sample was described previously in the Method. There were no differences in age, $t(70)=0.66$, $p=.513$, gender, $\chi^2(1)=0.19$, $p=.665$, or race, $\chi^2(5)=3.94$, $p=.558$, across NSSI groups (see Table 1).

Clinical Characteristics

Sixty-three percent of the sample ($n=45$) had bipolar disorder NOS, 32% ($n=23$) had bipolar I disorder, and 6% ($n=4$) had bipolar II disorder. Comorbidity was the norm: 92% ($n=66$) met criteria for a comorbid disorder, including 78% ($n=56$) attention-deficit/hyperactivity disorder (ADHD), 38% ($n=27$) oppositional defiant disorder (ODD), 9% ($n=6$) conduct disorder, and 35% ($n=24$) any anxiety disorder. Index mood episodes included 33% ($n=23$) mixed, 24% ($n=17$) manic, 23% ($n=16$) unspecified, 16% ($n=11$) depressed, and 4% ($n=3$) hypomanic. There were no differences in bipolar subtype across NSSI groups, $\chi^2(2)=0.07$, $p=.968$, even when bipolar I and II disorders were collapsed, $\chi^2(1)=0.02$, $p=.895$. There were also no differences in index episodes, $\chi^2(4)=6.21$, $p=.184$, or comorbidity, including: ADHD, $\chi^2(1)=1.35$, $p=.245$; ODD, $\chi^2(1)=0.52$, $p=.470$; conduct disorder, $\chi^2(1)=0.02$, $p=.897$; and anxiety, $\chi^2(1)=2.19$, $p=.139$, across NSSI groups. On continuous measures, those who endorsed NSSI reported more severe depression, $t(69)=2.20$, $p=.031$, and psychosis, $t(68)=3.95$, $p<.001$, than those who denied NSSI. However, mania, $t(68)=0.34$, $p=.732$, and global functioning, $t(69)=-0.94$, $p=.353$, did not vary across groups (see Table 1).

Suicidality

Regarding lifetime suicidal ideation, 22% ($n=16$) reported passive ideation, 14% ($n=10$) endorsed nonspecific active ideation, and 25% ($n=18$) reported severe ideation (with a method, intent, and/or plan). For current suicidal ideation, 11% ($n=8$) reported passive ideation, 15% ($n=11$) endorsed nonspecific active ideation, and 15% ($n=11$) reported severe ideation. Twenty-five percent ($n=18$) also reported a lifetime history of suicidal behavior (preparatory acts; aborted, interrupted, and actual attempts). Children who endorsed NSSI reported more severe lifetime ideation, $\chi^2(1)=4.28, p=.039$, more severe current ideation, $\chi^2(1)=6.70, p=.010$, more intense ideation, $t(70)=2.14, p=.036$, and were more likely to have engaged in suicidal acts, $\chi^2(1)=7.07, p=.008$, than those who denied NSSI (see Table 1).

Child Psychosocial Factors

Children who engaged in NSSI also reported higher levels of hopelessness, $t(60)=2.09, p=.041$, and lower self-esteem, $t(70)=-2.36, p=.021$, than children without NSSI. However, there were no significant differences in coping skills, $t(69)=1.08, p=.285$, or quality of life, $t(70)=-1.07, p=.290$, across groups (see Table 1).

Parent/Family Clinical/Psychosocial Factors

Finally, families of children who engaged in NSSI were less likely to seek help from family members, community agencies/programs, physicians, and counselors than families of children who denied NSSI, $t(69)=-2.35, p=.022$. Though, there were no differences in parent depression, $t(64)=0.22, p=.831$, parent mania, $t(69)=0.25, p=.802$, family functioning, $t(67)=0.14, p=.890$, or general family coping, $t(69)=-1.01, p=.315$, across NSSI groups (see Table 1).

Multivariate Logistic Regression Model of NSSI

Significant correlates identified in aforementioned univariate analyses were entered into a single multivariate logistic regression, including child depression, psychosis, lifetime and current severe SI, SI intensity, suicidal behaviors, hopelessness, self-esteem, and family help-seeking behaviors. According to the multivariate logistic regression, high levels of child depression, $OR=2.84$, and psychosis, $OR=5.15$,

and low levels of family help-seeking behaviors, $OR=0.67$, remained significantly associated with NSSI, after controlling for other variables found to be significant at the univariate level (see Table 2).

Impact of NSSI on Psychosocial Treatment Outcomes

In MRMs, NSSI did not influence the treatment effect on depressive symptoms (see Table 3). However, NSSI was a predictor of overall psychiatric severity outcomes, with a medium effect size, $d=0.47$ (see Table 3, Figure 1). Children who endorsed NSSI experienced steeper response trajectories for overall psychiatric severity over time, regardless of treatment group. In addition, NSSI moderated the response of manic symptoms to intervention, with a medium effect size, $d=0.45$ (see Table 3, Figure 2). Youth who denied NSSI showed a poorer response to TAU for manic symptoms than those who endorsed NSSI, whereas mania trajectories in CFF-CBT were similar across youth.

Discussion

To our knowledge, this is the second study to examine prevalence and correlates of NSSI in PBD, and the first to evaluate the impact of NSSI on psychosocial treatment outcomes for this population. NSSI was common. The strongest unique correlates of NSSI in multivariate analyses were depression, psychosis, and impaired family help-seeking. Suicidality, hopelessness, and low self-esteem were also associated with NSSI at the univariate level. Children who endorsed NSSI experienced steeper treatment response trajectories for overall psychiatric severity, regardless of treatment group. Youth who denied NSSI showed a poorer response to TAU for manic symptoms versus those who endorsed NSSI; mania trajectories in CFF-CBT were similar across youth, regardless of NSSI. These findings offer a broader conceptualization of NSSI in PBD, and suggest how these behaviors might influence response to intervention.

Impact of NSSI on Psychosocial Treatment Outcomes

The impact of NSSI on psychotherapy outcomes has been rarely examined in RCTs of CBT for depressed adolescents (Asarnow et al., 2009; Vitiello et al., 2011), and unstudied in intervention trials for PBD, until now. Children who denied NSSI showed a poorer response to TAU for manic

symptoms compared to those who endorsed NSSI. In contrast, mania trajectories in CFF-CBT were similar across youth, and superior to TAU. These results are similar to prior moderation analyses in the same RCT, which found that children with milder depression and greater self-confidence fared worse in TAU (Weinstein, Henry, et al., 2015). Thus, it is possible that TAU providers feel more concern and pressure to provide effective therapy to children presenting with more severe symptoms and NSSI, resulting in greater time and effort spent preparing for sessions and researching therapeutic strategies. Alternatively, it is possible that parents of children with more severe symptoms and NSSI are more motivated to engage in the therapy process. Thus, youth with NSSI may receive more intensive treatment in TAU, leading to enhanced outcomes. In contrast, mildly ill youth may inadvertently receive less powerful interventions and be less motivated to engage in therapy, resulting in attenuated treatment effects. These findings suggest that it may be important for children with PBD to receive intensive interventions, and amelioration of mania in particular may require more specialized strategies. Since CFF-CBT is manualized and targeted for PBD, all children are exposed to core treatment elements, which are based on dysfunctions particular to this population (Pavuluri, Graczyk, et al., 2004; West et al., 2014). This structure and specificity appears to facilitate improvement in symptoms and functioning across severity levels of PBD.

Presence of NSSI at baseline also influenced the treatment effect on children's overall psychiatric severity, such that children who endorsed NSSI experienced steeper response trajectories. This is in contrast to prior research, which found NSSI to be a predictor of poorer psychotherapy outcomes among depressed adolescents (Asarnow et al., 2009; Vitiello et al., 2011). One potential explanation for this is that in younger children with PBD, these symptoms and behaviors may not be as ingrained. Another reason this might occur is because children with more severe impairments initially may have more room for growth and improvement. Additional research is needed on this topic.

Finally, NSSI did not impede the response of depressive symptoms to psychosocial treatment in PBD. This is promising, given that NSSI and depression commonly co-occur (Esposito-Smythers et al., 2010; Fox et al., 2015; Hankin & Abela, 2011; for review see Jacobson & Gould, 2007), and NSSI is predictive of worse outcomes for depressed adolescents (Asarnow et al., 2009; Vitiello et al., 2011). One possible explanation for this lies in the heavy family involvement common in the treatment of PBD versus adolescent depression. For instance, parents may be able to easily monitor and intervene on maladaptive or unsafe behaviors. In addition, involvement in therapy might have provided basic strategies for ameliorating depressed mood, which appeared to be effective regardless of NSSI. Nevertheless, presence of NSSI seems to influence the response of children's manic symptoms and overall psychiatric severity to psychotherapy, and thus should be assessed, monitored, and considered in treatment.

Prevalence and Correlates of NSSI

Prevalence of NSSI (31%) was similar to studies reporting rates of NSSI in PBD (Esposito-Smythers et al., 2010) and other heterogeneous clinical samples (for review see Barrocas et al., 2011; DiClemente et al., 1991). This high prevalence, coupled with data indicating that an additional 10% of children endorsed thoughts of NSSI, highlights the severity of the sample. These results also suggest that NSSI in PBD is unfortunately common, even among school-aged children, and thus should be carefully evaluated and tracked.

Depression, psychosis, and impaired family help-seeking were correlates of NSSI in both univariate and multivariate analyses, suggesting that these constructs are strongly and uniquely associated with NSSI in PBD. However, NSSI was not associated with demographics, comorbidity, mania, coping skills, functioning, quality of life, or parental mood symptoms. Both depression and psychosis were predictive of NSSI in the one other study that examined this phenomenon in youth with PBD (Esposito-Smythers et al., 2010). Research with heterogeneous youth samples also implicated depression (Fox et al., 2015; Hankin & Abela, 2011; for review see Jacobson & Gould, 2007) and psychosis (Martin, Thomas, Andrews, Hasking, & Scott, 2015) as predictors of NSSI. Thus, the relationship between these constructs is robust, and may indicate a subset of youth with more severe symptomatology.

There are several other potential explanations for the strong association between NSSI, depression, and psychosis in PBD. For instance, NSSI may be closely linked to both depression and psychosis due to a common underlying deficit in emotion regulation (for review see Dickstein, Brazel, Goldberg, & Hunt, 2009; Fox et al., 2015; Fusar-Poli, Nelson, Valmaggia, Yung, & McGuire, 2014). The functional model of NSSI also offers insight into possible connections between these constructs (for review see Nock, 2010; Nock & Prinstein, 2004). For example, children who experience intense sadness or irritability might engage in NSSI to regulate overwhelming feelings, consistent with the intrapersonal negative reinforcement function of NSSI. This rationale is feasible, given that PBD is characterized by intense emotional reactivity (Birmaher et al., 2009; Geller et al., 2008), and intrapersonal negative reinforcement is the most commonly endorsed function of NSSI (Nock et al., 2009). However, during anhedonic depressive episodes, children might use NSSI to induce positive feelings or a desirable physiological response. In the context of psychosis, it is possible that youth engage in NSSI to escape intense and negative affective states associated with hallucinations and delusions, as psychosis may stem from a core dysfunction in emotion regulation (Fusar-Poli et al., 2014). These conclusions are purely speculative, given the general lack of literature on NSSI in PBD, and because functions of NSSI were not measured in this study. Nevertheless, NSSI in PBD should be assessed and considered in treatment planning, with a focus on understanding children's motivations, as alternate functions may indicate different strategies. If children endorse NSSI as a means of stabilizing intense emotions, affect regulation strategies might be helpful. Alternatively, if children use NSSI to create positive emotions or punish oneself, behavioral activation or cognitive restructuring could be salient.

Impaired family help-seeking was also a strong and unique correlate of NSSI, which is consistent with prior research (for review see Arbuthnott & Lewis, 2015). Thus, in addition to deficits in emotion regulation, children with PBD might also engage in NSSI for interpersonal reasons (for review see Nock, 2010; Nock & Prinstein, 2004). For example, it is possible that children use NSSI for interpersonal negative reinforcement, or to disrupt fighting or other familial processes commonly impaired in PBD (Keenan-Miller et al., 2012). Alternatively, if families are unable to ascertain assistance and appropriate

therapeutic services, youth may resort to maladaptive coping strategies (like NSSI) as a cry for help. Similarly, families' inability to acquire resources and solve problems could model and foster helplessness in children. In addition, NSSI may be a response to distress for children who find it hard to seek assistance from family members. Indeed, as youth often do not disclose NSSI, parents may not be aware of their children's difficulties (for review see Arbuthnott & Lewis, 2015). Thus, fostering open communication and targeting dysfunctional processes in families affected by PBD may be crucial. If children use NSSI to gain attention or support, teaching children and families alternative strategies via relationship-building activities and effective communication skills might be relevant. In addition, interventions that help parents mobilize resources and model help-seeking could improve NSSI in youth.

Finally, suicidality, hopelessness, and low self-esteem were correlated with NSSI at the univariate level only, suggesting that these constructs are related to NSSI, though not as strongly as depression, psychosis, and impaired family help-seeking. NSSI is more prevalent in youth with PBD who have a history of suicide attempts (Algorta et al., 2011; Goldstein et al., 2005; Goldstein et al., 2012), which may be due to an acquired capability for suicide according to the interpersonal theory of suicide (Joiner, 2005). However, further empirical research is needed to confirm the relevance of this theory in youth with PBD. Regarding the relationship between NSSI, hopelessness, and low self-esteem, children may engage in NSSI to ameliorate negative feelings, induce positive feelings or physiological states, or punish oneself, consistent with intrapersonal reinforcement functions of NSSI (for review see Nock, 2010; Nock & Prinstein, 2004). If future research confirms these associations, then emphasis on affect regulation and other coping skills for stabilizing mood might be important for youth with PBD who self-injure.

While NSSI is a risk factor for suicidality in and of itself, there are also some unique and overlapping correlates for these dangerous behaviors, which warrant discussion. Depression, hopelessness, and low self-esteem are correlates of both NSSI and suicidality in PBD (Esposito-Smythers et al., 2010; for review see Hauser et al., 2013; Weinstein, Van Meter, et al., 2015). Thus, it might be important to assess for and address these impairments in treatment, and when they are present, closely monitor for both NSSI and suicidality. However, the strongest unique correlates of SI and NSSI differed in this sample. Quality of

life and family rigidity were specific to SI (Weinstein, Van Meter, et al., 2015), while psychosis and impaired family help-seeking were exclusively associated with NSSI. Thus, families of children with NSSI might require additional training in advocacy, problem-solving, and effective communication. Importantly, children with PBD and NSSI should be closely monitored for psychosis, given that these youth seem to be at increased risk for thought problems. In sum, NSSI appears to be a common and complex phenomenon in PBD, which requires further investigation.

Limitations and Future Directions

Several limitations should be noted. First, these analyses were secondary and not adequately powered to examine NSSI in PBD. In addition, as NSSI was assessed over the past year, the more proximal relationship between NSSI and baseline constructs is unknown. The modest sample size also precluded the examination of NSSI across different severity levels, and may have resulted in reduced power to detect small effects. Similarly, grouping all youth together who endorsed NSSI may have obscured differences between children who engaged in repeated versus less frequent NSSI. Also, the outpatient clinical sample likely restricts the generalizability of results, as findings may not apply to adolescents with PBD or youth in intensive treatment. Further, equal distribution of bipolar diagnoses was not observed. A majority of children had bipolar disorder NOS, which is expected given the age of the sample, but this limited power to compare NSSI across bipolar subtypes. Also, correlates of NSSI were evaluated via cross-sectional data, and NSSI was only assessed at baseline in this study. Thus, the temporal relationship between NSSI and associated constructs cannot be certain. Relatedly, analyses focused on the association between lifetime suicidal behaviors and NSSI in the past year; thus, findings cannot speak to the proximal relationship between these behaviors. Finally, as functions of NSSI were not specifically evaluated, the reasons youth engaged in these behaviors remain speculative at this point. While prior work offers a theoretical explanation for why youth might engage in NSSI, these functions are not necessarily mutually exclusive (for review see Nock, 2010; Nock & Prinstein, 2004). Therefore, such functions may lack the ability to fully discriminate and explain why individuals engage in NSSI.

Despite randomization, baseline differences in children's manic symptoms emerged. Controlling for baseline mania reduced power in these models. Similarly, differential treatment completion in CFF-CBT versus TAU and attrition over follow-up may have limited power to detect longitudinal group differences. In addition, the medium-sized sample precluded examination of differing severity levels of NSSI on treatment outcomes. Also, although providers in both CFF-CBT and TAU were trainees at comparable levels and all were novice to the treatment of PBD, it is possible that differences in characteristics and training backgrounds of therapists across groups impacted findings. Thus, additional studies should evaluate the effectiveness and generalizability of CFF-CBT across settings and clinicians.

Future research should also replicate findings in larger samples. We were unable to examine cyclothymia in the current sample, but future work should evaluate NSSI across the full spectrum of bipolar disorders. Differences across severity levels of NSSI should also be examined, especially among those who engage in NSSI versus those who report thoughts of NSSI only, to determine predictors of progression from thoughts to behaviors. In addition, studies should longitudinally measure NSSI trajectories, functions, and the influence of potential risk factors, such as the frequency and severity of mood symptoms. Also, more nuanced measurement of NSSI behaviors may discern intricacies in the relationship between NSSI and intervention response in PBD. Further research should also examine associations among NSSI and suicidal behaviors in PBD, and determine the relevance of the interpersonal theory of suicide (Joiner, 2005) for this population. Finally, additional work is needed to discern whether youth with PBD and NSSI represent a distinct subgroup that may be at increased risk for more severe emotion dysregulation and other disorders characterized by NSSI later in life, such as borderline personality disorder.

Clinical Implications and Conclusions

Findings highlight the importance of evaluating NSSI in youth with PBD. Children with more severe depression and psychosis, and low-resource families, might be at the highest risk and benefit from extra supports. Interventions aimed at understanding why children engage in NSSI and offering more effective means of fulfilling these needs may be beneficial. Identified correlates suggest that youth with PBD may

engage in NSSI due emotion dysregulation, lack of family coping skills, and for intrapersonal and interpersonal negative and positive reinforcement. If future research confirms the relevance of these factors in understanding NSSI in PBD, then therapeutic strategies linked to these deficits might be important, such as affect regulation, behavioral activation, positive family relationship-building activities, effective communication, and parental advocacy. Of note, these elements are incorporated in CFF-CBT, which may be one of the reasons why this psychosocial treatment was efficacious in treating PBD, regardless of NSSI.

Results also suggest that TAU may look different for children with varying presentations. Mildly ill youth with fewer severe presenting issues (e.g., absence of NSSI) may inadvertently receive less potent interventions in TAU and thus fare worse than children with greater dysfunction. Therefore, structured interventions that target dysfunctions specific to PBD, such as CFF-CBT, may be most effective for ameliorating symptoms and optimizing outcomes across severity levels of PBD.

Compliance with Ethical Standards

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent and assent were obtained from all parents and children, respectively, who participated in this study.

References

- Algorta, G. P., Youngstrom, E. A., Frazier, T. W., Freeman, A. J., Youngstrom, J. K., & Findling, R. L. (2011). Suicidality in pediatric bipolar disorder: Predictor or outcome of family processes and mixed mood presentation? *Bipolar Disorders*, *13*, 76-86. doi:10.1111/j.1399-5618.2010.00886.x
- Altman, E. G., Hedeker, D., Peterson, J. L., & Davis, J. M. (1997). The Altman Self-Rating Mania Scale. *Biological Psychiatry*, *42*, 948-955. doi:10.1016/s0006-3223(96)00548-3
- Arbuthnott, A. E., & Lewis, S. P. (2015). Parents of youth who self-injure: A review of the literature and implications for mental health professionals. *Child and Adolescent Psychiatry and Mental Health*, *9*, 35. doi:10.1186/s13034-015-0066-3
- Asarnow, J. R., Emslie, G., Clarke, G., Wagner, K. D., Spirito, A., Vitiello, B., . . . Brent, D. (2009). Treatment of selective serotonin reuptake inhibitor-resistant depression in adolescents: Predictors and moderators of treatment response. *Journal of the American Academy of Child and Adolescent Psychiatry*, *48*, 330-339. doi:10.1097/CHI.0b013e3181977476
- Asarnow, J. R., Porta, G., Spirito, A., Emslie, G., Clarke, G., Wagner, K. D., . . . Brent, D. A. (2011). Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescents: Findings from the TORDIA study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *50*, 772-781. doi:10.1016/j.jaac.2011.04.003
- Barbe, R. P., Bridge, J., Birmaher, B., Kolko, D., & Brent, D. A. (2004). Suicidality and its relationship to treatment outcome in depressed adolescents. *Suicide and Life-Threatening Behavior*, *34*, 44-55.
- Barrocas, A. L., Jenness, J. L., Davis, T. S., Oppenheimer, C. W., Technow, J. R., Gulley, L. D., . . . Hankin, B. L. (2011). Developmental perspectives on vulnerability to nonsuicidal self-injury in youth. In J. B. Benson & J. B. Benson (Eds.), *Advances in child development and behavior*, Vol 40. (pp. 301-336). San Diego, CA: Elsevier Academic Press.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX; Psychological Corporation.

- Birmaher, B., Axelson, D., Goldstein, B., Strober, M., Gill, M. K., Hunt, J., . . . Keller, M. (2009). Four-year longitudinal course of children and adolescents with bipolar spectrum disorders: The Course and Outcome of Bipolar Youth (COBY) study. *American Journal of Psychiatry*, *166*, 795-804.
doi:10.1176/appi.ajp.2009.08101569
- Conners, C., & March, J. (1996). *The Conners/March Developmental Questionnaire*. Toronto, ON: MultiHealth Systems, Inc.
- Curry, J., Rohde, P., Simons, A., Silva, S., Vitiello, B., Kratochvil, C., . . . March, J. (2006). Predictors and moderators of acute outcome in the Treatment for Adolescents with Depression Study (TADS). *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*, 1427-1439.
doi:10.1097/01.chi.0000240838.78984.e2
- Dickstein, D. P., Brazel, A. C., Goldberg, L. D., & Hunt, J. I. (2009). Affect regulation in pediatric bipolar disorder. *Child and Adolescent Psychiatric Clinics of North America*, *18*, 405-420.
doi:10.1016/j.chc.2008.12.003
- DiClemente, R. J., Ponton, L. E., & Hartley, D. (1991). Prevalence and correlates of cutting behavior: Risk for HIV transmission. *Journal of the American Academy of Child and Adolescent Psychiatry*, *30*, 735-739. doi:10.1097/00004583-199109000-00006
- Esposito-Smythers, C., Goldstein, T., Birmaher, B., Goldstein, B., Hunt, J., Ryan, N., . . . Keller, M. (2010). Clinical and psychosocial correlates of non-suicidal self-injury within a sample of children and adolescents with bipolar disorder. *Journal of Affective Disorders*, *125*, 89-97.
doi:10.1016/j.jad.2009.12.029
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, *42*, 156-167.
doi:10.1016/j.cpr.2015.09.002
- Fusar-Poli, P., Nelson, B., Valmaggia, L., Yung, A. R., & McGuire, P. K. (2014). Comorbid depressive and anxiety disorders in 509 individuals with an at-risk mental state: Impact on psychopathology and transition to psychosis. *Schizophrenia Bulletin*, *40*, 120-131. doi:10.1093/schbul/sbs136

- Geller, B., Tillman, R., Bolhofner, K., & Zimmerman, B. (2008). Child bipolar I disorder: Prospective continuity with adult bipolar I disorder; Characteristics of second and third episodes; Predictors of 8-year outcome. *Archives of General Psychiatry*, 65, 1125-1133. doi:10.1001/archpsyc.65.10.1125
- Geller, B., Zimmerman, B., Williams, M., Bolhofner, K., Craney, J. L., DelBello, M. P., & Soutullo, C. (2001). Reliability of the Washington University in St. Louis Kiddie Schedule for Affective Disorders and Schizophrenia (WASH-U-KSADS) mania and rapid cycling sections. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 450-455. doi:10.1097/00004583-200104000-00014
- Goldstein, T. R., Birmaher, B., Axelson, D., Goldstein, B. I., Gill, M. K., Esposito-Smythers, C., . . . Keller, M. (2009). Psychosocial functioning among bipolar youth. *Journal of Affective Disorders*, 114, 174-183. doi:10.1016/j.jad.2008.07.001
- Goldstein, T. R., Birmaher, B., Axelson, D., Ryan, N. D., Strober, M. A., Gill, M. K., . . . Keller, M. (2005). History of suicide attempts in pediatric bipolar disorder: Factors associated with increased risk. *Bipolar Disorders*, 7, 525-535. doi:10.1111/j.1399-5618.2005.00263.x
- Goldstein, T. R., Fersch-Podrat, R. K., Rivera, M., Axelson, D. A., Merranko, J., Yu, H., . . . Birmaher, B. (2015). Dialectical behavior therapy for adolescents with bipolar disorder: Results from a pilot randomized trial. *Journal of Child and Adolescent Psychopharmacology*, 25, 140-149. doi:10.1089/cap.2013.0145
- Goldstein, T. R., Ha, W., Axelson, D. A., Goldstein, B. I., Liao, F., Gill, M. K., . . . Birmaher, B. (2012). Predictors of prospectively examined suicide attempts among youth with bipolar disorder. *Archives of General Psychiatry*, 69, 1113-1122. doi:10.1001/archgenpsychiatry.2012.650
- Hankin, B. L., & Abela, J. R. (2011). Nonsuicidal self-injury in adolescence: Prospective rates and risk factors in a 2(1/2) year longitudinal study. *Psychiatry Research*, 186, 65-70. doi:10.1016/j.psychres.2010.07.056

- Hauser, M., Galling, B., & Correll, C. U. (2013). Suicidal ideation and suicide attempts in children and adolescents with bipolar disorder: A systematic review of prevalence and incidence rates, correlates, and targeted interventions. *Bipolar Disorders, 15*, 507-523. doi:10.1111/bdi.12094
- Horton, S. E., Hughes, J. L., King, J. D., Kennard, B. D., Westers, N. J., Mayes, T. L., & Stewart, S. M. (2016). Preliminary examination of the interpersonal psychological theory of suicide in an adolescent clinical sample. *Journal of Abnormal Child Psychology, 44*, 1133-1144. doi:10.1007/s10802-015-0109-5
- Jacobson, C. M., & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research, 11*, 129-147. doi:10.1080/13811110701247602
- Joiner, T. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1997). Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 980-988. doi:10.1097/00004583-199707000-00021
- Kazdin, A. E., Rodgers, A., & Colbus, D. (1986). The Hopelessness Scale for Children: Psychometric characteristics and concurrent validity. *Journal of Consulting and Clinical Psychology, 54*, 241-245.
- Keenan-Miller, D., Peris, T., Axelson, D., Kowatch, R. A., & Miklowitz, D. J. (2012). Family functioning, social impairment, and symptoms among adolescents with bipolar disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 51*, 1085-1094. doi:10.1016/j.jaac.2012.08.005
- Martin, G., Thomas, H., Andrews, T., Hasking, P., & Scott, J. G. (2015). Psychotic experiences and psychological distress predict contemporaneous and future non-suicidal self-injury and suicide attempts in a sample of Australian school-based adolescents. *Psychological Medicine, 45*, 429-437. doi:10.1017/s0033291714001615

- McCubbin, H. I., Olson, D. H., & Larsen, A. S. (1991). F-COPES: Family Crisis Oriented Personal Evaluation Scales. In H. I. McCubbin & A. I. Thompson (Eds.), *Family assessment inventories for research and practice* (2nd ed., pp. 203-218). Madison, WI: University of Wisconsin-Madison.
- McCubbin, H. I., Thompson, A. I., & Elver, K. M. (1996). Youth Coping Index (YCI). In H. I. McCubbin, A. I. Thompson, & M. A. McCubbin (Eds.), *Family assessment: Resiliency, coping and adaptation-Inventories for research and practice* (pp. 585-612). Madison, WI: University of Wisconsin-Madison.
- Muehlenkamp, J. J. (2005). Self-injurious behavior as a separate clinical syndrome. *American Journal of Orthopsychiatry*, 75, 324-333. doi:10.1037/0002-9432.75.2.324
- Nock, M. K. (2010). Self-injury. *Annual Review of Clinical Psychology*, 6, 339-363. doi:10.1146/annurev.clinpsy.121208.131258
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72, 885-890. doi:10.1037/0022-006X.72.5.885
- Nock, M. K., Prinstein, M. J., & Sterba, S. K. (2009). Revealing the form and function of self-injurious thoughts and behaviors: A real-time ecological assessment study among adolescents and young adults. *Journal of Abnormal Psychology*, 118, 816-827. doi:10.1037/a0016948
- Olson, D. (2011). FACES IV and the circumplex model: Validation study. *Journal of Marital and Family Therapy*, 37, 64-80. doi:10.1111/j.1752-0606.2009.00175.x
- Pavuluri, M. N., Graczyk, P. A., Henry, D. B., Carbray, J. A., Heidenreich, J., & Miklowitz, D. J. (2004). Child- and family-focused cognitive-behavioral therapy for pediatric bipolar disorder: Development and preliminary results. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43, 528-537. doi:10.1097/00004583-200405000-00006
- Pavuluri, M. N., Henry, D. B., Devineni, B., Carbray, J. A., & Birmaher, B. (2006). Child Mania Rating Scale: Development, reliability, and validity. *Journal of the American Academy of Child and Adolescent Psychiatry*, 45, 550-560. doi:10.1097/01.chi.0000205700.40700.50

- Pavuluri, M. N., Henry, D. B., Devineni, B., Carbray, J. A., Naylor, M. W., & Janicak, P. G. (2004). A pharmacotherapy algorithm for stabilization and maintenance of pediatric bipolar disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43, 859-867.
doi:10.1097/01.chi.0000128790.87945.2f
- Perlis, R. H., Dennehy, E. B., Miklowitz, D. J., Delbello, M. P., Ostacher, M., Calabrese, J. R., . . . Sachs, G. (2009). Retrospective age at onset of bipolar disorder and outcome during two-year follow-up: Results from the STEP-BD study. *Bipolar Disorders*, 11, 391-400. doi:10.1111/j.1399-5618.2009.00686.x
- Piers, E. V., & Herzberg, D. S. (2002). *Piers-Harris Children's Self-Concept Scale-Second Edition Manual*. Los Angeles, CA: Western Psychological Services.
- Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., . . . Mann, J. J. (2011). The Columbia-Suicide Severity Rating Scale: Initial validity and internal consistency findings from three multisite studies with adolescents and adults. *American Journal of Psychiatry*, 168, 1266-1277. doi:10.1176/appi.ajp.2011.10111704
- Poznanski, E. O., Grossman, J. A., Buchsbaum, Y., Banegas, M., Freeman, L., & Gibbons, R. (1984). Preliminary studies of the reliability and validity of the Children's Depression Rating Scale. *Journal of the American Academy of Child and Adolescent Psychiatry*, 23, 191-197.
- Ravens-Sieberer, U., & Bullinger, M. (1998). Assessing health-related quality of life in chronically ill children with the German KINDL: First psychometric and content analytical results. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 7, 399-407.
- Rohde, P., Seeley, J. R., Kaufman, N. K., Clarke, G. N., & Stice, E. (2006). Predicting time to recovery among depressed adolescents treated in two psychosocial group interventions. *Journal of Consulting and Clinical Psychology*, 74, 80-88. doi:10.1037/0022-006x.74.1.80
- Shaffer, D., Gould, M. S., Brasic, J., Ambrosini, P., Fisher, P., Bird, H., & Aluwahlia, S. (1983). A Children's Global Assessment Scale (CGAS). *Archives of General Psychiatry*, 40, 1228-1231.

- Spearing, M. K., Post, R. M., Leverich, G. S., Brandt, D., & Nolen, W. (1997). Modification of the Clinical Global Impressions (CGI) Scale for use in bipolar illness (BP): The CGI-BP. *Psychiatry Research*, 73, 159-171.
- Stewart, J. G., Esposito, E. C., Glenn, C. R., Gilman, S. E., Pridgen, B., Gold, J., & Auerbach, R. P. (2017). Adolescent self-injurers: Comparing non-ideators, suicide ideators, and suicide attempters. *Journal of Psychiatric Research*, 84, 105-112. doi:10.1016/j.jpsychires.2016.09.031
- Van Meter, A. R., Burke, C., Kowatch, R. A., Findling, R. L., & Youngstrom, E. A. (2016). Ten-year updated meta-analysis of the clinical characteristics of pediatric mania and hypomania. *Bipolar Disorders*, 18, 19-32. doi:10.1111/bdi.12358
- Van Meter, A. R., Moreira, A. L., & Youngstrom, E. A. (2011). Meta-analysis of epidemiologic studies of pediatric bipolar disorder. *Journal of Clinical Psychiatry*, 72, 1250-1256. doi:10.4088/JCP.10m06290
- Vitiello, B., Emslie, G., Clarke, G., Wagner, K. D., Asarnow, J. R., Keller, M. B., . . . Brent, D. A. (2011). Long-term outcome of adolescent depression initially resistant to selective serotonin reuptake inhibitor treatment: A follow-up study of the TORDIA sample. *Journal of Clinical Psychiatry*, 72, 388-396. doi:10.4088/JCP.09m05885blu
- Weinstein, S. M., Henry, D. B., Katz, A. C., Peters, A. T., & West, A. E. (2015). Treatment moderators of child- and family-focused cognitive-behavioral therapy for pediatric bipolar disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 54, 116-125. doi:10.1016/j.jaac.2014.11.007
- Weinstein, S. M., Van Meter, A., Katz, A. C., Peters, A. T., & West, A. E. (2015). Cognitive and family correlates of current suicidal ideation in children with bipolar disorder. *Journal of Affective Disorders*, 173, 15-21. doi:10.1016/j.jad.2014.10.058
- West, A. E., Weinstein, S. M., Peters, A. T., Katz, A. C., Henry, D. B., Cruz, R. A., & Pavuluri, M. N. (2014). Child- and family-focused cognitive-behavioral therapy for pediatric bipolar disorder: A randomized clinical trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53, 1168-1178, 1178.e1161. doi:10.1016/j.jaac.2014.08.013

- Wilkinson, P., Kelvin, R., Roberts, C., Dubicka, B., & Goodyer, I. (2011). Clinical and psychosocial predictors of suicide attempts and nonsuicidal self-injury in the Adolescent Depression Antidepressants and Psychotherapy Trial (ADAPT). *American Journal of Psychiatry*, 168, 495-501. doi:10.1176/appi.ajp.2010.10050718
- Young, R. C., Biggs, J. T., Ziegler, V. E., & Meyer, D. A. (1978). A rating scale for mania: Reliability, validity and sensitivity. *British Journal of Psychiatry*, 133, 429-435.

Table 1

Descriptive Statistics for Demographic, Clinical, and Psychosocial Correlates of Non-Suicidal Self-Injury among Children with Pediatric Bipolar Disorder

Variables	NSSI (n=22)	No NSSI (n=50)	Statistic χ^2/t
Demographics			
Age, <i>M(SD)</i>	9.41(1.71)	9.14(1.55)	0.66
Gender (Male), <i>n</i> (%)	12(55)	30(60)	0.19
Race (Caucasian), <i>n</i> (%)	13(59)	28(56)	3.94
Clinical Characteristics			
Bipolar I Disorder, <i>n</i> (%)	7(32)	16(32)	0.07
Index Episode (Mixed), <i>n</i> (%)	8(36)	15(31)	6.21
Attention-Deficit/Hyperactivity Disorder, <i>n</i> (%)	19(86)	37(74)	1.35
Oppositional Defiant Disorder, <i>n</i> (%)	7(32)	20(41)	0.52
Conduct Disorder, <i>n</i> (%)	2(9)	4(8)	0.02
Any Anxiety Disorder, <i>n</i> (%)	10(48)	14(29)	2.19
Depression, <i>M(SD)</i>	3.62(0.92)	3.04(1.05)	2.20*
Mania, <i>M(SD)</i>	3.62(0.67)	3.55(0.79)	0.34
Psychosis, <i>M(SD)</i>	2.10(1.37)	1.18(0.57)	3.95***
Global Functioning, <i>M(SD)</i>	48.57(7.16)	49.94(4.87)	-0.94
Suicidality			
Current Severe Suicidal Ideation, <i>n</i> (%)	7(32)	4(8)	6.70*
Lifetime Severe Suicidal Ideation, <i>n</i> (%)	9(41)	9(18)	4.28*
Lifetime Suicidal Ideation Intensity, <i>M(SD)</i>	8.00(6.97)	4.56(5.97)	2.14*
Lifetime Suicidal Behaviors, <i>n</i> (%)	10(45)	8(16)	7.07**
Child Psychosocial Factors			
Hopelessness, <i>M(SD)</i>	5.30(3.21)	3.75(2.43)	2.09*
Self-Esteem, <i>M(SD)</i>	39.12(9.93)	45.06(9.81)	-2.36*
Coping Skills, <i>M(SD)</i>	99.52(17.21)	94.76(16.91)	1.08
Quality of Life, <i>M(SD)</i>	62.83(10.84)	66.31(13.47)	-1.07
Parent/Family Clinical/Psychosocial Factors			
Parent Depression, <i>M(SD)</i>	10.88(7.20)	10.33(11.07)	0.22
Parent Mania, <i>M(SD)</i>	3.38(2.75)	3.20(2.78)	0.25
Family Functioning, <i>M(SD)</i>	1.88(0.61)	1.86(0.56)	0.14
Family Coping Skills, <i>M(SD)</i>	97.84(15.03)	101.35(12.81)	-1.01
Family Help-Seeking Behaviors, <i>M(SD)</i>	14.02(3.46)	15.96(3.11)	-2.35*

NSSI Non-Suicidal Self-Injury

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

Table 2*Final Logistic Regression of Correlates of Non-Suicidal Self-Injury*

Variables	B	SE	OR	95% CI	Wald χ^2
Depression	1.05	0.51	2.84	1.04-7.76	4.17*
Psychosis	1.64	0.76	5.15	1.17-22.66	4.71*
Current Severe Suicidal Ideation	-2.00	2.17	0.14	0.00-9.59	0.85
Lifetime Severe Suicidal Ideation	0.00	1.11	1.00	0.12-8.76	0.00
Lifetime Suicidal Ideation Intensity	0.04	0.07	1.04	0.91-1.19	0.34
Lifetime Suicidal Behaviors	0.36	1.06	1.43	0.18-11.46	0.11
Hopelessness	0.21	0.19	1.23	0.86-1.77	1.24
Self-Esteem	-0.05	0.06	0.95	0.84-1.07	0.75
Family Help-Seeking Behaviors	-0.40	0.16	0.67	0.49-0.92	6.05*

* $p < .05$

Table 3

Final Mixed-Effects Regression Models Examining Impact of Non-Suicidal Self-Injury on Psychosocial Treatment Outcomes

Effect	Mania		Depression		Overall Psychiatric Severity	
	$\beta(SE)$	d	$\beta(SE)$	d	$\beta(SE)$	d
Intercept	8.80(2.66)**	—	19.21(1.92)***	—	3.28(0.17)***	—
Time	0.04(0.08)	0.14	-0.06(0.08)	0.19	-0.04(0.01)***	1.00
Treatment (CFF-CBT)	-6.47(1.96)**	0.81	-6.19(2.46)*	0.61	-0.37(0.20)~	0.44
NSSI	-1.75(2.32)	0.18	-2.25(3.11)	0.18	-0.04(0.26)	0.04
Treatment x Time	-0.21(0.10)*	0.50	-0.16(0.08)*	0.50	-0.02(0.01)*	0.55
Treatment x NSSI	4.66(3.15)	0.36	5.11(4.44)	0.28	0.22(0.37)	0.15
Time x NSSI	-0.24(0.12)~	0.48	-0.10(0.09)	0.27	-0.02(0.01)~	0.47
Treatment x Time x NSSI	0.29(0.16)~	0.45	0.09(0.12)	0.18	0.02(0.02)	0.31
Quadratic	—	—	0.01 (0.00)**	—	0.00(0.00)***	—
Baseline Mania	0.62(0.08)***	—	—	—	—	—

CFF-CBT Child- and Family-Focused Cognitive-Behavioral Therapy; *NSSI* Non-Suicidal Self-Injury; *d* Cohen's *d* effect sizes

~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

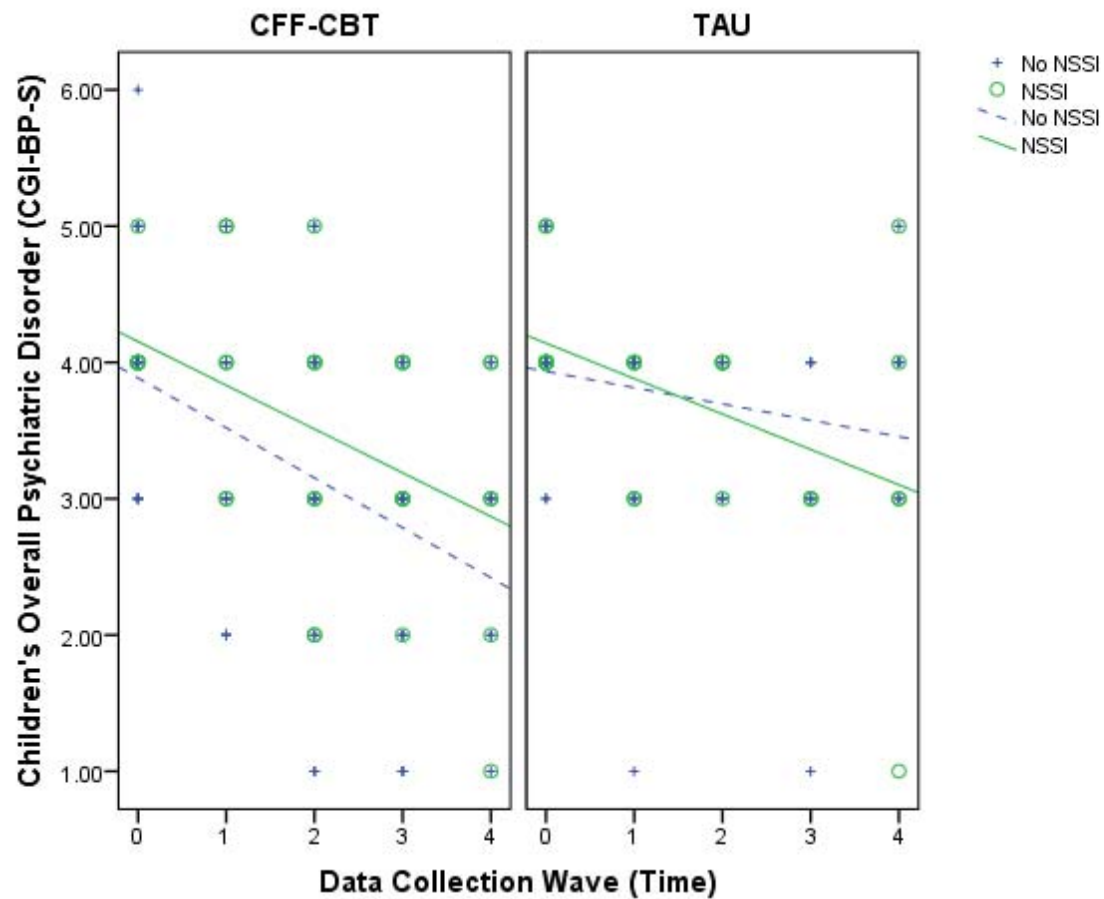


Fig. 1 Impact of non-suicidal self-injury on intervention response for children's overall psychiatric disorder. *CGI-BP-S* Children's Global Impressions Scales for Bipolar Disorder-Severity; *CFF-CBT* Child- and Family-Focused Cognitive-Behavioral Therapy; *TAU* Treatment As Usual. Data Collection Wave (Time): 0 baseline; 1 4 weeks; 2 8 weeks; 3 12 weeks/post-treatment; 4 39 weeks/6-month follow-up.

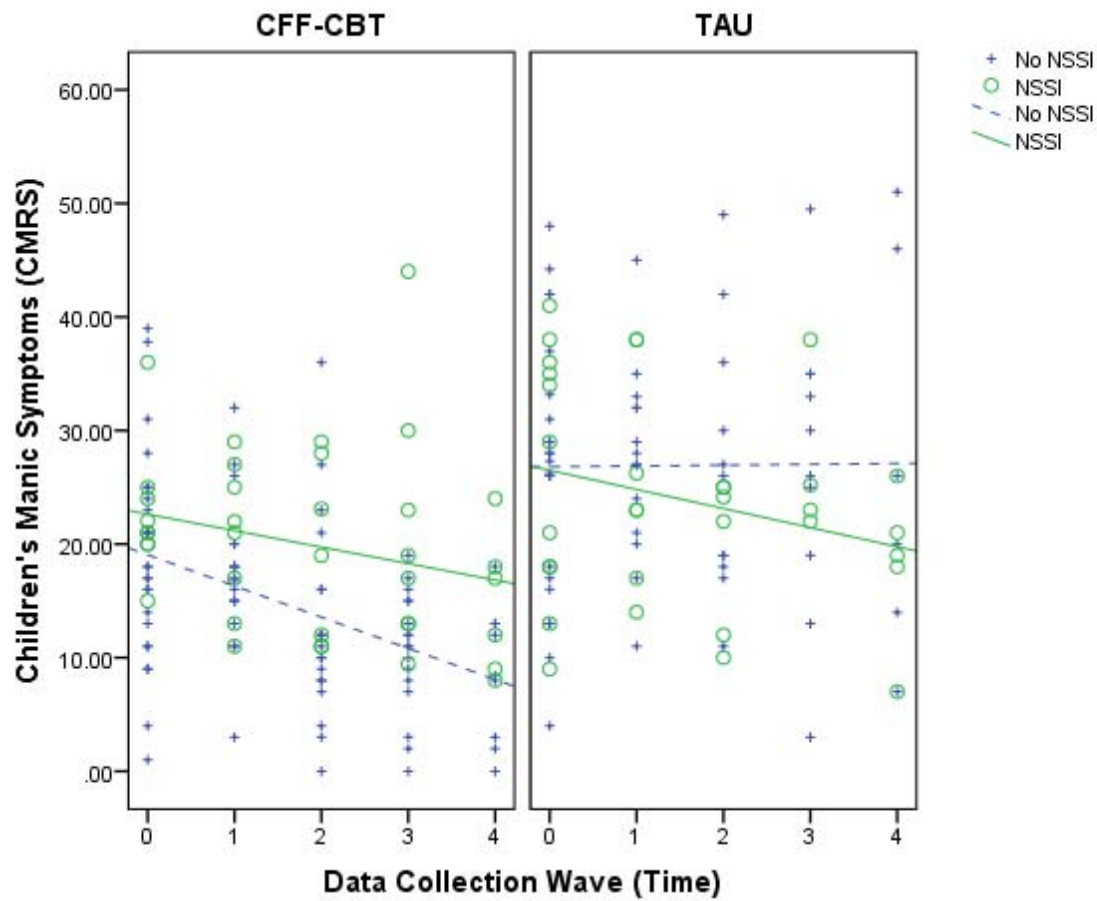


Fig. 2 Impact of non-suicidal self-injury on intervention response for children's manic symptoms. *CMRS* Children's Mania Rating Scale; *CFF-CBT* Child- and Family-Focused Cognitive-Behavioral Therapy; *TAU* Treatment As Usual. Data Collection Wave (Time): 0 baseline; 1 4 weeks; 2 8 weeks; 3 12 weeks/post-treatment; 4 39 weeks/6-month follow-up.