



# Emotion dysregulation mediates the influence of relationship difficulties on non-suicidal self-injury behavior in young adults



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## ABSTRACT

This study examined associations between relationship difficulties with parents and peers and non-suicidal self-injury (NSSI). Particular emphasis was placed on examining mediating pathways through emotion dysregulation, as per commonly accepted theory. Participants were 1153 university students (905 females;  $M_{\text{age}} = 19.35$  years,  $S.D. = 1.49$ ); 79 of these participants had engaged in NSSI during the previous 6 months (63 females,  $M_{\text{age}} = 19.35$  years,  $S.D. = 1.51$ ). Participants completed questionnaires assessing NSSI, quality of relationships with parents and peers, and emotion dysregulation. Hierarchical logistic regressions suggest that the quality of parent–child relationships has a greater impact on the prediction of NSSI engagement than the quality of peer relationships. Results of a structural equation model showed that feelings of alienation in both parent and peer relationships had indirect effects on NSSI through deficits in emotion regulation (ER). Results suggest the importance of examining emotion dysregulation in association with NSSI, and that both parent and peer relationships are implicated in NSSI engagement through emotion regulation deficits. Important clinical implications regarding the need to acknowledge both emotion dysregulation and interpersonal difficulties when treating NSSI in young adults are discussed.

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## 1. Introduction

Non-suicidal self-injury (NSSI) is defined as purposeful, self-inflicted injury that is performed without conscious suicidal intent and using methods that are not socially sanctioned (Nixon and Heath, 2009), and which results in tissue damage. Common methods used include cutting, self-burning, and punching or hitting one's self (Nock, 2010). Although NSSI was initially conceptualized as a negative coping behavior common in psychiatrically diagnosed individuals, recent research shows the behavior is also prevalent in community populations, with between 10% and 44% of Canadian and American high school and university student samples reporting having engaged in NSSI (Heath et al., 2009). NSSI is a serious health risk for youth, particularly considering that a number of self-injuring youth will never seek medical attention or treatment (Conterio and Lader, 1998; Rodham and Hawton, 2009), and are thus at increased risk for infection or accidental death (Muehlenkamp, 2006; Whitlock et al., 2007).

Given the risks faced by individuals who engage in NSSI, a great deal of research has focused on identifying risk factors associated with the behavior. The influence of both parent and peer relationships has been investigated extensively in association with NSSI engagement, based on their importance for development during adolescence and early adulthood (Lundh et al., 2009; Bureau et al., 2010; Heilbron and Prinstein, 2010). However, the majority of existing research in this area has addressed parent and peer related influences separately, thus, additional study is needed to fully understand their relative influences in predicting NSSI behavior.

### 1.1. Linehan's biosocial theory

Linehan's widely accepted biosocial theory (1993) for the development of NSSI proposes that invalidating relationships with parents, in which the individual's emotions are negated or ignored, contribute to deficits in emotion regulating capacities which in turn increase the likelihood of engaging in NSSI behavior to cope with distress. Emotion regulation (ER) deficits arise from biological anomalies combined with exposure to dysfunctional environments (i.e., invalidating relationships with parents) throughout development. The

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invalidating environments component of Linehan's biosocial theory is of particular focus for the current manuscript.

Invalidating family environments are characterized by the parents' unpredictable and insensitive responses to the offspring's emotional expressions. Such environments may feature parent–child relationships in which there is limited trust within the parent–child dyad, where communication is disrupted, and where the child ultimately becomes alienated from the parent (see [Martin et al., 2011](#)). Within such environments individuals' experiences of distressing emotions are overlooked by the parent, and the individuals' understanding of his or her own behavior is disregarded. Family environments in which feelings are discredited, invalidated, or rejected fail to provide the child with the ability to appropriately manage their emotions, particularly negative emotions, using socially appropriate coping behavior. Consequently, as adolescents or young adults, these individuals may be at increased likelihood for engaging in NSSI in order to cope with their emotional limitations.

### 1.2. Invalidating parent–child relationships, ER difficulties, and NSSI

A great deal of research supports Linehan's theory. Poor quality parent–child relationships characterized by a number of invalidating relational characteristics have been linked with NSSI across multiple adolescent and young adult community samples ([Gratz et al., 2002](#); [Claes et al., 2004](#); [Gratz, 2006](#); [Wedig and Nock, 2007](#); [Bjärehead and Lundh, 2008](#); [Hilt et al., 2008](#); [Yates et al., 2008](#); [Crowell et al., 2009b](#); [Lundh et al., 2009](#); [Bureau et al., 2010](#)). Researchers have also demonstrated links between negative family environments and lapses in emotion regulating capacities. For instance, adequate ER skills are believed to develop through sensitive parental care (see [Calkins and Hill, 2007](#)), and emotion dysregulation may occur as a result of poor emotional support within the family context ([Yap et al., 2008](#)). However, emotion dysregulation as a possible mechanism to explain associations between parent–child relationships and NSSI has been overlooked in the empirical literature.

To our knowledge, only [Adrian et al. \(2011\)](#) have directly examined ER difficulties as a mediator between invalidating family environments and NSSI. These researchers found that negative family relationships (i.e., lack of family cohesion, family conflict, and punishing emotion socialization) directly predicted increased frequency of NSSI behavior. Moreover, these characteristics *indirectly* predicted more frequent NSSI through corresponding links with ER difficulties (i.e., emotion dysregulation patterns, expressive reluctance, and lack of emotional awareness). These findings are just as one would expect given the details of Linehan's biosocial theory outlined above ([Linehan, 1993](#)).

### 1.3. Invalidating peer relationships, ER difficulties, and NSSI

Adolescence and young adulthood are developmental periods during which peer relationships become equally or even more important to one's psychological adjustment as relationships with parents ([Larson and Richards, 1991](#); [Rose and Rudolph, 2006](#)). As a result, [Crowell et al. \(2009a\)](#) extended Linehan's theory (1993) to incorporate the impact of continued social detriment through disrupted peer relationships as an additional interpersonal predictor of NSSI engagement.

Emotional support from peers is a known protective factor against the effects of life stressors, while negative interactions, including peer victimization, increase the risk for maladjustment ([Prinstein et al., 2001](#); [Storch et al., 2003](#); [Storch and Masia-Warner, 2004](#); [La Greca and Harrison, 2005](#)). The limited research regarding quality of peer relationships and NSSI specifically demonstrate similar results. [Lundh et al. \(2009\)](#) showed that peer

relationships characterized by poor emotional tone were correlated with a greater NSSI frequency for both boys and girls in a sample of 992 adolescents. Similarly, [Hilt et al. \(2008\)](#) found that girls reporting poor communication with their peers were more likely to engage in NSSI when also exposed to peer victimization in a sample of 94 female middle and high school students.

Information regarding the role of invalidating peer relationships in association with ER difficulties is more limited, though links have been established between peer victimization and experiencing more negative emotions ([Heilbron and Prinstein, 2010](#)). Further, adequate peer support ([Thompson et al., 2002](#); [Brugha et al., 2005](#)) and social engagement within the peer group ([Scrimanti, 2002](#); [Steffens et al., 2005](#)) may protect against deficits in mental health and social functioning, suggesting additional associations between positive peer interaction and optimal ER strategies. Thus, as proposed by [Crowell et al. \(2009a\)](#), negative experiences with peers appear to be associated with deficits in ER. This establishes a potential mechanism similar to that described above regarding parent–child relationship quality, by which quality of peer relationships would predict NSSI through corresponding ER deficits.

Again, [Adrian et al. \(2011\)](#) are the only researchers to have empirically tested this notion to date. These authors found that peer relational problems (i.e., over victimization, relational victimization, and negative interactions) predicted greater NSSI frequency indirectly through links with ER difficulties, but not directly. This preliminary information suggests that poor peer relationships may not be sufficient in themselves in predicting NSSI behavior, but rather the corresponding emotional deficits associated with poor peer interaction are influential. These findings, combined with those discussed previously regarding the role of invalidating parent–child relationships, provide important preliminary information regarding the validity of the biosocial theory for NSSI's development ([Linehan, 1993](#); [Crowell et al., 2009a](#)). However, this model was tested within a small ( $N=99$ ) clinical sample of females, and it is unclear if these findings would replicate in a larger sample collected from a non-psychiatric source.

### 1.4. The current study

The goal of the present study was to build upon findings from [Adrian et al. \(2011\)](#) within a larger, co-ed, normative sample ( $N=1153$ ). In particular, the use of a larger sample provides a more robust analysis of structural equation modeling (SEM; e.g., recommended minimum sample size of 200; [Kenny, 2012](#)). The current study represents an important empirical contribution such that it addresses statistical support for the biosocial theory of NSSI ([Linehan, 1993](#); [Crowell et al., 2009a](#)), and further elucidates the roles of important relationships and ER difficulties within a community sample of late adolescents and young adults.

#### 1.4.1. Objectives and hypotheses

The current study was guided by four over-arching hypotheses. First, as a preliminary step, we expected that relationship difficulties would predict NSSI engagement in an additive manner; that is, difficulties across both parent and peer relationships would account for more variance in NSSI engagement than would either type of difficulty alone. Second, we expected that relationship difficulties with parents and peers (represented by three variables measured separately for parents and for peers: lack of trust, poor communication and alienation), and difficulties in ER (represented by one measured variable) would directly predict engagement in NSSI behavior. Third, relationship difficulties with parents and peers were expected to directly predict difficulties in ER. Finally, it was hypothesized that difficulties in ER would mediate associations between relationship difficulties with both parents and peers

and engaging in NSSI behavior. We expected that high levels of trust and communication within parent and peer relationships would be negatively associated with difficulties in ER and with engagement in NSSI behavior, while alienation within parent and peer relationships would be positively associated with difficulties in ER and NSSI behavior.

## 2. Method

### 2.1. Participants

A total of 1331 students participated in this ongoing study. Of these, 165 participants were excluded from analyses for failing to complete questionnaires beyond the first few questions of the online survey package. An additional 10 participants were removed due to outlying scores, and three for failing to provide sufficient information about their NSSI behavior. The final sample was composed of 1153 university students (905 females (79%),  $M_{\text{age}}=19.35$  years,  $S.D.=1.49$ ). The majority of participants in the sample identified themselves as from Caucasian background (71%;  $n=815$ ), with Asian (9%;  $n=106$ ), Black (7%;  $n=80$ ), and Middle-Eastern (6%;  $n=67$ ) ethnicities also represented.

From the overall sample, 79 individuals reported having engaged in NSSI during the previous 6 months (63 females,  $M_{\text{age}}=19.35$  years,  $S.D.=1.51$ ), reflecting a 6.9% prevalence rate of NSSI within the current sample. The most commonly reported methods of self-injury included cutting (54.5%), self-hitting (40.0%), and burning (40.0%); all self-injuring participants endorsed behavior qualifying for the tissue damage criteria of NSSI's definition (i.e., cutting, burning, biting, self-hitting, piercing skin with pointy objects, and trying to break bones). The majority of participants who had engaged in recent NSSI endorsed a 1 to 5 time frequency (82.3%), while 7.6% had self-injured monthly and weekly, and 2.5% had engaged in daily NSSI.

### 2.2. Procedure

Participants were students from introductory psychology classes at a Canadian university who participated in the study for course credit. Individuals were provided a secure Internet link to a series of online questionnaires hosted on Survey Monkey. Anonymous 5-digit identification codes were assigned to participants by the computerized system in order to label data; no other identifying information was collected. Participants were presented with an informed consent sheet at the outset of participation, and submission of the online questionnaires implied consent to participate. Following completion of the questionnaires, a two-page resource sheet describing the city's mental health resources was provided on screen, instructing participants to contact these resources should they require support following the study. All procedures for this study were approved by the institution's Research Ethics Board, and participants were treated in accordance with the national and institutional ethical standards for human experimentation.

### 2.3. Measures

#### 2.3.1. NSSI

Items from the *Ottawa Self-Injury Inventory* (OSI; Cloutier and Nixon, 2003; Martin et al., 2013) were used to assess characteristics of recent (within the previous 6 months) NSSI. NSSI engagement was determined by responses to "How many times in the past six months have you purposefully injured yourself without the intent to kill yourself?" Responses indicated the frequency of recent NSSI (not at all, 1 to 5 times, monthly, weekly, daily) and were collapsed to create a dichotomous NSSI engagement variable (not at all vs. all other frequencies combined) to be used in main analyses. Additional items were used in the current study to assess descriptive characteristics of NSSI behavior including age of onset and methods used. Past research has demonstrated the OSI's capacity to measure NSSI behavior, and its test-retest reliability (Cloutier and Nixon, 2003).

#### 2.3.2. Emotion dysregulation

The *Difficulties in Emotion Regulation Scale* (DERS; Gratz and Roemer, 2004) is a 36-item self-report measure used to assess difficulties in ER through six dimensions: lack of emotional awareness (6 items), lack of emotional clarity (5 items), non-acceptance of emotional responses (6 items), limited access to ER strategies (8 items), impulse control difficulties (6 items), and difficulties engaging in goal-directed behavior (5 items). Response options range from *almost never* to *almost always* on a 5-point scale, and are summed to yield a total score (ranging from 36 to 180) as well as subscale scores, with higher scores indicating greater difficulty with ER. In the current study, only the total score was used. The DERS has shown in the past good internal consistency, construct and predictive validity as well as test-retest reliability (Gratz and Roemer, 2004). In the current study, the total scale showed excellent internal consistency ( $\alpha=0.93$ ).

#### 2.3.3. Parent and peer trust, communication, alienation

The *Inventory of Parent and Peer Attachment* (IPPA; Armsden and Greenberg, 1987) measures the quality of participants' relationships with parents and peers. The IPPA-parent is a 28-item self-report measuring the dimensions of trust (10 items), communication (10 items) and alienation (8 items). Similarly, the IPPA-peer is a 25-item self-report measure yielding the same three subscales: trust (10 items), communication (8 items) and alienation (7 items). Both measures use a 5-point response scale from *almost never or never true* to *almost always or always true*. For both parent and peer scales, the trust dimensions reflects the degree to which individuals feel supported and understood by parents and peers. The communication subscales represent the participants' feelings of being able to approach parents and peers when in distress. Finally, the alienation dimensions reflect the individuals' feelings that the relational other cannot be approached or relied upon during times of emotional upset. These constructs were selected based on their conceptual overlap with characteristics of invalidating interpersonal environments. Strong test-retest reliability and convergent validity with measures of anxiety and depression have been shown for the IPPA (Armsden and Greenberg, 1987; Lopez and Gover, 1993). Internal consistency was good to excellent in the current study, within the trust-parent ( $\alpha=0.93$ ), trust-peer ( $\alpha=0.94$ ), communication-parent ( $\alpha=0.91$ ), communication-peer ( $\alpha=0.92$ ), and alienation-parent ( $\alpha=0.87$ ), alienation-peer ( $\alpha=0.74$ ) dimensions.

## 3. Results

### 3.1. Preliminary Analyses

Prior to conducting analyses, the data were screened to verify that assumptions were met (see Tabachnick and Fidell, 2007). Missing values were estimated using expectation maximization for the relevant scales (excluding NSSI engagement) as less than 5% of data were missing. Means, standard deviations and inter-correlations for the main variables are presented in Table 1. Results demonstrated significant correlations between all the main variables. Potential covariates, including age, gender, ethnicity and current living arrangements (e.g., living with parents or not) were examined, though ultimately none were included in analyses due to limited correlation with the outcome of having engaged in NSSI ( $r$ s between  $-0.19$  and  $0.07$ ).

### 3.2. Additive prediction of NSSI by relationship difficulties with parents and peers

Two hierarchical logistic regressions tested the cumulative effects of parent and peer relationship difficulties as predictors of NSSI. Given the cross-sectional measurement of our data, parent variables were entered first and peer variables second in the first regression, while the opposite order was used in the second regression.

In the first regression (Table 2), the set of parent variables accounted for 11% of variance (Nagelkerke's  $R^2=0.113$ ; Step 1 omnibus  $\chi^2(3)=52.58$ ,  $p<0.001$ ) in the odds of engaging in NSSI, with feeling alienated from parents emerging as the sole predictor increasing the odds of NSSI. Counter to prediction, the addition of peer relational difficulties in the second step did not account for additional variance in the odds of having engaged in NSSI (Nagelkerke's  $R^2=0.124$ , Step 2 omnibus  $\chi^2(3)=5.14$ ,  $p=0.16$ ).

In the second regression (Table 3), peer variables entered in the first step accounted for a significant amount of variance in the odds of NSSI engagement (Nagelkerke's  $R^2=0.079$ ; Step 1 omnibus  $\chi^2(3)=36.22$ ,  $p<0.001$ ), with peer alienation driving the prediction. Adding parent variables in the second step further contributed to the model (Nagelkerke's  $R^2=0.124$ ; Step 2 omnibus  $\chi^2(3)=21.50$ ,  $p<0.001$ ), such that greater parent alienation predicted increased odds of NSSI engagement. Moreover, inclusion of the parent variables in the second step rendered the influences of peer alienation non-significant.

**Table 1**  
Standardized descriptive statistics and inter-correlations for relationship difficulties, emotion dysregulation, and NSSI.

	M	S.D.	1	2	3	4	5	6	7	8
Parent–child relationships <sup>a</sup>										
1. Trust	40.05	8.51	-							
2. Communication	35.68	9.20	0.82***	-						
3. Alienation	17.17	6.80	-0.68***	-0.67***	-					
Peer relationships <sup>a</sup>										
4. Trust	41.75	7.62	0.47***	0.38***	-0.32***	-				
5. Communication	30.73	6.87	0.39***	0.40***	-0.25***	0.86***	-			
6. Alienation	15.77	4.72	-0.33***	-0.32***	0.63***	-0.40***	-0.30***	-		
7. Emotion regulation <sup>b</sup>	84.59	21.45	-0.39***	-0.33***	0.54***	-0.36***	-0.28***	0.50***	-	
8. Non-suicidal self-injury <sup>c</sup>	0.07	0.25	-0.16***	-0.15***	0.22***	-0.11**	-0.08**	0.18***	0.20***	-

N=1153.

<sup>a</sup> Trust, communication, alienation within parent and peer relationships measured by the IPPA-parent and IPPA-peer respectively.

<sup>b</sup> Emotion regulation measured by the DERS.

<sup>c</sup> Non-suicidal self-injury measured by the OSI.

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

**Table 2**  
Hierarchical logistic regressions examining the additive predictive influence of parent and peer relationship difficulties (Parent variables in step 1).

Predictors	B	SE	Wald $\chi^2$	Odds ratio	95% CI	
					LL	UL
Step 1						
Parent trust <sup>a</sup>	-0.002	0.02	0.01	0.99	0.95	1.05
Parent communication <sup>a</sup>	-0.001	0.02	0.002	0.99	0.96	1.05
Parent alienation <sup>a</sup>	0.12	0.02	24.11***	1.12	1.07	1.18
Step 2						
Parent trust <sup>a</sup>	0.002	0.03	0.01	1.00	0.95	1.05
Parent communication <sup>a</sup>	-0.01	0.02	0.18	0.99	0.95	1.04
Parent alienation <sup>a</sup>	0.09	0.03	9.20	1.09	1.03	1.16
Peer trust <sup>b</sup>	-0.03	0.03	0.99	0.97	0.91	1.03
Peer communication <sup>b</sup>	0.02	0.04	0.27	1.02	0.95	1.09
Peer alienation <sup>b</sup>	0.05	0.03	1.97**	1.05	0.98	1.12

N = 1153. B=constant coefficient; SE=standard error; CI=confidence interval; LL=lower limit; UL=upper limit.

<sup>a</sup> Trust, communication, alienation within parent relationship difficulties measured by the IPPA-parent.

<sup>b</sup> Trust, communication, alienation within peer relationship difficulties measured by the IPPA-peer.

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

### 3.3. Mediation analyses

The model examining mediating pathways to NSSI through difficulties in ER from relationship difficulties with either parents or peers was tested (Fig. 1) using Mplus software version 16.2 (Muthén and Muthén, 2011). Bias corrected (BC) confidence intervals were calculated using bootstrapping (5000 samples) methods in order to obtain more powerful confidence interval (CI) limits for indirect effects (Preacher and Hayes, 2008). Results are discussed in terms of direct and indirect effects.

#### 3.3.1. Direct effects

Counter to expectation, the SEM results showed that neither relationship difficulties with parents nor with peers directly predicted NSSI behavior (Fig. 1). However, poor communication with and feeling alienated by parents predicted emotion dysregulation, while lack of trust in parents did not. Moreover, lack of trust in and feeling alienated by peers were each directly predictive of ER deficits, while poor communication with peers was not. Finally, and in line with hypotheses, difficulties in ER directly increased the likelihood of engaging in NSSI.

**Table 3**  
Hierarchical logistic regressions examining the additive predictive influence of parent and peer relationship difficulties (Peer variables in step 1).

Predictors	B	SE	Wald $\chi^2$	Odds ratio	95% CI	
					LL	UL
Step 1						
Peer trust <sup>a</sup>	-0.04	0.03	1.36	0.97	0.91	1.02
Peer communication <sup>a</sup>	0.01	0.03	0.16	1.01	0.95	1.08
Peer alienation <sup>a</sup>	0.12	0.03	21.05***	1.13	1.07	1.19
Step 2						
Peer trust <sup>a</sup>	-0.03	0.03	0.99	0.97	0.91	1.03
Peer communication <sup>a</sup>	0.02	0.04	0.27	1.02	0.95	1.09
Peer alienation <sup>a</sup>	0.05	0.03	1.97	1.05	0.98	1.12
Parent trust <sup>b</sup>	0.002	0.03	0.01	1.00	0.95	1.05
Parent communication <sup>b</sup>	-0.01	0.02	0.18	0.99	0.94	1.04
Parent alienation <sup>b</sup>	0.09	0.03	9.20**	1.09	1.03	1.16

N = 1153. B=constant coefficient; SE=standard error; CI=confidence interval; LL=lower limit; UL=upper limit.

<sup>a</sup> Trust, communication, alienation within peer relationship difficulties measured by the IPPA-peer.

<sup>b</sup> Trust, communication, alienation within parent relationship difficulties measured by the IPPA-parent.

\*\*  $p < 0.01$ .

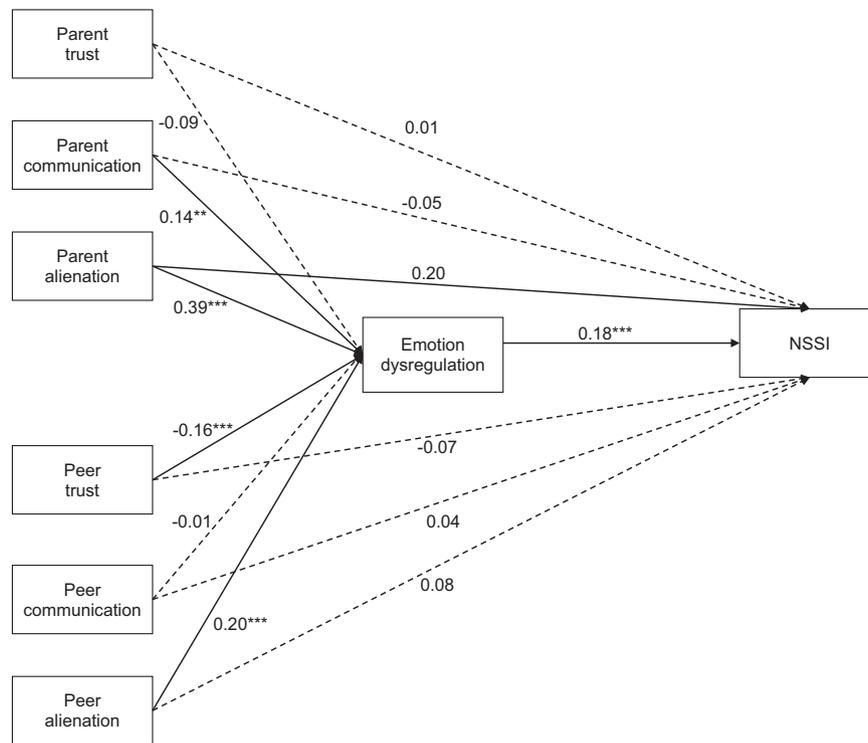
\*\*\*  $p < 0.001$ .

#### 3.3.2. Indirect effects

As predicted, a number of indirect effects were identified. Feeling alienated by parents indirectly predicted NSSI engagement through corresponding associations with emotion dysregulation (see Table 4), while the indirect effect for poor communication with parents was marginally significant ( $p=0.058$ ). Feeling alienated by peers also indirectly predicted NSSI engagement through emotion dysregulation. The indirect path from lack of trust in peers through emotion dysregulation to NSSI engagement was also marginally significant ( $p=0.065$ ), while poor communication with peers was not indirectly associated with NSSI.

## 4. Discussion

Theoretical and empirical work has shown that NSSI is commonly used to regulate aversive emotion (Linehan, 1993; Klonsky, 2007). According to Linehan's broadly accepted theory (1993) and its extension (Crowell et al., 2009a), invalidating social environments decrease ER capacities, which then increase the likelihood of engaging in NSSI behavior. While this theory is generally accepted, empirical testing of it is lacking (see Adrian et al., 2011 for an



**Fig. 1.** Standardized coefficients for the mediating role of emotion dysregulation in the association between relationship difficulties and NSSI. The rectangles denote measured variables. The solid lines represent significant direct effects while the dotted lines represent non-significant direct effect. NSSI=non-suicidal self-injury. \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

**Table 4**  
Standardized indirect effects from relationship difficulties with parents and peers to non-suicidal self-injury through emotion dysregulation.

	Standardized estimate	SE	BC 95% CI	
			LL	UL
<b>Parent-child relationships<sup>a</sup></b>				
Trust	-0.016	0.011	-0.038	0.006
Communication	0.023 <sup>†</sup>	0.012	0.001	0.047
Alienation	0.067*	0.028	0.012	0.123
<b>Peer relationships<sup>a</sup></b>				
Trust	-0.027 <sup>†</sup>	0.015	-0.056	-0.002
Communication	-0.001	0.009	-0.019	0.016
Alienation	0.034*	0.014	0.014	0.062

$N = 1153$ . SE=standard error; BC=biased corrected; CI=confidence interval; LL=lower limit; UL=upper limit.

<sup>a</sup> Trust, communication, alienation within parent and peer relationship difficulties measured by the IPPA-parent and IPPA-peer respectively.

\*  $p < 0.05$ .

<sup>†</sup>  $p < 0.10$ .

exception). The current findings demonstrate that specific invalidating characteristics of both parent and peer relationships are associated with NSSI through corresponding associations with emotion dysregulation, providing additional empirical support for this theory. Results also suggest that, although poor quality of relationships with both parents and peers predict NSSI engagement, disruptions in relationships with parents appear more influential.

**4.1. Additive versus unique prediction of NSSI from parent and peer relationships**

The hypothesis that relationship difficulties with parents and peers would predict NSSI in an additive manner was not supported, though the findings were nonetheless meaningful. These results instead showed that feelings of alienation within parent-

child relationships (i.e., feeling that parents cannot be relied upon in times of distress) accounted for NSSI engagement beyond the effect of feeling alienated in peer relationships, suggesting that negative aspects of peer relationships may be less influential in NSSI engagement than similar experiences within relationships with parents.

This notion is coherent with findings from past research. For example, Lundh et al. (2009) examined correlations between NSSI and emotional tone in close relationships with parents and peers. The authors found that the magnitude of correlations with NSSI was stronger for poor parent-child relationships than for peer relationships. In a second study, these authors used cluster analysis to investigate young girls' profiles of emotional tone in close relationships in association with characteristics of NSSI. Results showed that frequent NSSI was reported by individuals with parent relationships characterized by poor emotional tone, but peer relationships characterized by good emotional tone. This suggests that positive aspects of relationships with peers do not completely protect against the potential negative effects of poor relationships with parents, and that in turn, parent-child relationships characterized by negative features are more detrimental with respect to NSSI than are similar detriments in peer relationships. This is not to say that feeling alienated from peers is not associated with engaging in NSSI, indeed our results show that there is in fact such an association, so long as parent-child relationship quality is not included in the model.

**4.2. Indirect Effects of parent and peer relationships**

Partial support was obtained for hypotheses regarding indirect prediction of NSSI for both parent and peer relationships. As expected feeling alienated by parents predicted NSSI behavior through corresponding associations with ER deficits. A similar path was identified for poor communication with parents, though it was only marginally significant. No direct effects from disrupted

parent–child relationships were identified. Similar results were found regarding peer influences, with peer alienation significantly increasing the odds of NSSI engagement through emotion dysregulation, and lack of trust in peer relationships having a marginal indirect influence. Contrary to expectation, none of the relational characteristics predicted NSSI behavior directly. These findings are in line with past research (Adrian et al., 2011), as well as Linehan's biosocial theory (1993) and its extension (Crowell et al., 2009a), such that negative characteristics of parent–child and peer relationships were associated with NSSI only through dysregulated emotional processes.

Two important implications can be drawn from these findings. First, relational characteristics may only influence NSSI behavior through paths from emotion dysregulation. With regard to parent–child relationships, findings are in line with past research that has shown alienation to be the sole relational characteristic associated with NSSI when other characteristics are simultaneously accounted for (Yates et al., 2008; Bureau et al., 2010). Moreover, Kaess et al. (2013) found that maternal antipathy (defined as “hostility, coldness, or rejection shown toward the child” p. 266), which shares characteristics with both alienation and poor communication, predicts NSSI engagement beyond the influence of other maternal and paternal factors. These influences are quite intuitive. For instance, individuals who feel alienated (i.e., feel that the relational other would not provide reliable support in times of distress) from their parents are perhaps less likely to approach parents in times of emotional need, or less likely to receive adequate parental responses to these needs, thus limiting opportunities for learning appropriate ER strategies to cope with distress. Moreover, good communication with caregivers may be influential in the acquisition of emotional knowledge, as evidenced by studies concerning mother–child interactions regarding emotional material. Researchers have previously shown that mothers' ability to effectively communicate about emotionally laden experiences strongly predicted their offspring's ER skills during childhood (Shipman et al., 2007). In contrast, while trust is certainly an important aspect in the quality of a relationship in general, current results suggest that it might be less salient with respect to NSSI.

The second implication is that the particular relational characteristics associated with NSSI (through emotion dysregulation) vary between relationships with parents versus with peers. Although the importance of alienation was also emphasized in peer relationships, communication issues were pertinent only when stemming from parent–child relationships. For peer relationships, a lack of trust was (marginally) implicated. This suggests that, with regard to NSSI engagement, being able to trust one's peers as being reliable providers of support is more important than is trusting parents. This can be at least partly explained by the fact that individuals personally select their peers, and thus mutually beneficial and adaptive relationship with peers may rely more strongly on trust than do parental relationships, which are not self-selected. In any case, this particular finding deserves further attention as to the potential for different influences on social and emotional well-being from parent and peer relationships. Alternatively, given that parents are less likely to be the preferred confidants of many adolescents, the ability to effectively and appropriately regulate one's emotions may become increasingly reliant on having trustworthy peers to turn to in times of need. That said, it is unclear why, contrary to prediction, poor communication with peers was unrelated to NSSI. While past research has suggested that problems communicating with peers should be associated with NSSI (Hilt et al., 2008) this may be an issue only relevant to earlier adolescence, and was not apparent in our current sample of undergraduate students.

### 4.3. Limitations

Although this research provides important information regarding relationship difficulties, ER deficits and NSSI, it is not without limitations. First the current study relied solely on self-report measures, which may be affected by the individuals' current context. Future work should include multi-methods such as self-reports, observational measures of relationship quality or ER deficits, or even interview methods to ensure a better understanding of the relevant concepts. Second, the cross-sectional design of the current study restricts the interpretation of findings related to the etiological influence of parent and peer relationships on the development of NSSI behavior. Without a longitudinal design, it was not possible to determine the temporal directionality of the relevant links. However, the model tested in the current study was based on Linehan's biosocial theory (1993), and past research (e.g., Adrian et al., 2011), and thus we followed the direction suggested by this theory. Finally, the use of a university student sample limits the generalizability of results. Findings may not apply to all self-injurers of similar age who do not attend university.

### 4.4. Future research directions and clinical implications

Additional research should be conducted to better understand the role of relationship difficulties and emotion dysregulation in association with NSSI, particularly implementing longitudinal designs to confirm the direction of the effects found in this and in Adrian et al. (2011) studies. Future studies should also consider including individual interviews or dyadic discussion tasks as a means to objectively identify relationship difficulties within parent and peer relationships, and to better identify difficulties in ER.

Further examination of the predictive pathways through ER deficits to NSSI can provide additional ideas for possible prevention or early intervention for NSSI behavior. Findings from such research should be used jointly to establish preventive and treatment strategies in normative populations, as a way to expand our understanding of NSSI and, consequently, our capacity to properly and correctly educate the general population. Based on the findings of the current study, effective clinical assessment and treatment models should acknowledge and improve ER capacities, along with the potential corresponding issues of relationship difficulties in parental and peer relationships. Clinicians, school personnel, and parents identifying NSSI in young adults should also be conscious to the potential repercussions of relational components in the development of NSSI.

### 4.5. Conclusions

The current study contributes to our understanding of the different parent–child, peer, and ER difficulties predicting NSSI behaviors in young adults. Findings from the present study support the role of invalidating environments proposed in Linehan's biosocial theory (1993) as well as Crowell et al.'s extension of it (2009a), by showing that negative or invalidating social environments with parents or peers influence engagement in NSSI behavior through deficits in ER abilities, even in community populations. Furthermore, this study represents an important contribution to our knowledge about ER and NSSI as it shows that the extent to which ER is involved in the development of NSSI behavior depends on which type of relationship is being studied, and which specific characteristics of these relationships are examined. Findings from this study and from future studies on this topic emphasize the importance of both interpersonal competencies and ER in the treatment of NSSI.

## 5. Contributors

Kim Yurkowski: contributed to data analysis and wrote the manuscript.

Jodi Martin: contributed to study design, assisted in writing and revising the manuscript.

Christine Levesque: conducted data analyses and revised the manuscript.

Jean-François Bureau: contributed to study design and revised the manuscript.

Marie-France Lafontaine: contributed to study design and revised the manuscript.

Paula Cloutier: contributed to study design and revised the manuscript.

## Conflicts of interest

There are no conflicts of interest to report.

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