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Adolescent non-suicidal self-injury and its relationships with school bullying and peer rejection☆

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ABSTRACT

The central goal of this study was to examine the associations of school bullying and peer rejection with non-suicidal self-injury (NSSI), as well as their interactive role in a sample of non-clinical adolescents. Six hundred and forty adolescents (253 Males, M_{age} = 15.60, SD = 1.65) self-reported measures of school bullying and NSSI and provided sociometric ratings of peer rejection. The results showed that being involved in bullying (as bullies, victims, or bully-victims) increases the likelihood to engage in NSSI; being rejected by peers amplifies the probability, for victims and bully-victims, of using NSSI at least once. The findings support the hypothesis that peer relationships play a key-role in determining NSSI and the importance to implement programs aimed to improve the school climate in order to avoid maladjusted behaviors in adolescence.

1. Introduction

Non-suicidal self-injury (NSSI) among adolescents is an ongoing public health concern. NSSI is commonly defined as direct, deliberate and socially unacceptable destruction of or harm to one's own body tissue without suicidal intent (Nock, 2010, 2009). In the diagnostic nomenclature, the inclusion of NSSI as an independent syndrome is a still ongoing process (Zetterqvist, 2015). In DSM IV (American Psychiatric Association, 1994), NSSI was listed as a symptom of Borderline Personality disorder, but research during the past two decades has led NSSI researchers to correct several misconceptions regarding its diagnosis and to classify NSSI in DSM 5 as its own diagnostic entity for further study (American Psychiatric Association, 2013). Moreover, the high prevalence of non-suicidal self-injury behaviors in non-clinical samples of adolescents (Stanford et al., 2017) has suggested the importance to better define individual characteristics and relational patterns associated to these behaviors. A wide variety of functions for NSSI has been identified (see reviews by Klonsky, 2007 and Taylor et al., 2017), both in clinical and community samples (Lloyd-Richardson et al., 2007). These functions are generally distinguishable into intrapersonal (e.g., NSSI that serves to manage one's negative emotions or to generate positive feelings or stimulation, respectively reflecting negative and positive reinforcement) and inter-personal functions (e.g., NSSI that serves to facilitate escape from social situations or to elicit attention and promote help-seeking behavior, respectively indicating negative and positive reinforcement). Overall, it is suggested that people use NSSI as a maladaptive strategy to cope with their affective and social experience arising from stressful events, because of intra- or interpersonal vulnerabilities that predispose them to perceive such events as particularly overwhelming and difficult to handle (Nock, 2009).

Recent research has suggested a link between NSSI behavior and experiences within the peer group and the school setting (Madjar, Ben Shabat et al. 2017; Madjar, Zalsman et al., 2017; Yin et al., 2017). In the present study, we will investigate the associations between NSSI and two specific dimensions related to peer relationships within the school context: the individual involvement in school bullying (as a bully, a victim or both) and the experience of being rejected by peers. Previous investigations have found consistent and positive associations between NSSI and bullying victimization (Moore et al., 2017), whereas relatively few studies have investigated the association between being a bully and/or a bully-victim and NSSI, providing little evidence to support any causal relationship and conclude that both being a bully and being a bully-victim increase the likelihood to engage in NSSI (Barker et al., 2008; Claes et al., 2015). Moreover, limited research, to our knowledge, has specifically focused on the association between NSSI and peer rejection (PR), whose conceptualization refers to being disliked by peers (Coie and Dodge, 1983) and similarly involves both bullies and victims

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(Sentse et al., 2015). Further, no study has investigated whether the level of rejection within the peer group could moderate the association between bullying roles and NSSI. The aim of our study is to investigate the association between NSSI with bullying roles (bully, victim, bully-victim, and not-involved) and PR, testing whether PR moderates this association. Our study represents a novelty in the literature, contributing to understand the complex peer dynamics underlying NSSI behavior.

1.1. Non-suicidal self-Injury and school bullying

School bullying is an ongoing concern worldwide. Bullying is a specific type of aggression involving intentional, repetitive abuses against peers, aimed at causing harm to the victim operating within an imbalance of power between bullies and victims. Bully is considered who perpetrates the aggression, victim who suffers from the aggression by bully, and bully-victim is who in different episodes can interpret both roles.

In a meta-analytic study, Van Geel et al. (2015) analyzed nine studies carried out with non-clinical adolescents, finding that peer victimization is one of the major correlates of NSSI during adolescence. More specifically, their results showed that the odds of NSSI in victims were 2.1 compared with not-involved children in school bullying. Consistent with this result, another meta-analytic study by Moore et al. (2017) concluded that there was convincing evidence for a causal relationship between bullying victimization and NSSI in childhood and adolescence. A large number of intrapersonal factors, such as self-compassion (Jiang et al., 2016) and depression (Baiden et al., 2017; Claes et al., 2015; Karanikola et al., 2018), have been found to moderate or partially mediate this relationship, thus providing a considerable empirical support to the affect-regulation model of NSSI, which considers NSSI as a maladaptive coping mechanism to deal with negative emotions induced by peer victimization.

Fewer studies have investigated the associations between being involved in bullying as a bully and as a bully-victim with NSSI. One study found that being a bully was positively associated with NSSI, both directly and indirectly through the mediation of depressive symptoms (Claes et al., 2015), but the authors did not include bully-victims in their analyses. Conversely, Barker et al. (2008) found that both bullies and bully-victims were more likely to display NSSI, compared to those who were neither bullies nor victims, whereas results from Özdemir and Stattin (2011) showed a positive association only for bully-victims. Similarly, Latina and Stattin (2016) found that being involved in mutual hostile relationships, as bully-victims are, was a risk factor for engaging in NSSI, suggesting the importance of considering NSSI behavior within the wider context of peer relationships. While the mechanisms linking being victimized by peers and NSSI have been tested and verified in prior research, still unclear are those underlying the association between perpetration and NSSI. With this respect, in their systematic review, Meszaros et al. (2017) found that the association between externalizing behaviors, as bullying could be considered, and NSSI was due to psychological mechanisms such as impulsivity, reduced self-regulating abilities, and disruptive symptoms in general.

1.2. Non-suicidal self-injury, school context and peer relationships

The quality of peer relationships within the school context plays a significant role in NSSI. For instance, Madjar and colleagues (Madjar, Ben Shabat et al. 2017; Madjar, Zalsman et al., 2017) found that students who committed repetitive NSSI perceived teachers' psychological support, sense of school belongingness, and peer climate more negatively than peers who did not engage in NSSI. Similar findings were found by Foster et al. (2017), who investigated the association between NSSI with school and peer connectedness.

Sociometric measures have been rarely considered in the study on NSSI. Sociometry refers to how much a child or adolescent is rejected or accepted by their peers (Dodge et al., 2011; Newcomb and Bukowski, 1983) and it is commonly evaluated within the classroom context. Commonly based on the method of peer nominations in the empirical studies, sociometry is a powerful approach to understand whether a peer is liked or disliked by their peers, because it is based on peer-report measures rather than on self-report measures. Even if it is plausible that PR could be a risk factor for NSSI, previous research did not find a direct association with NSSI, accounting for victimization (Giletta et al., 2012; Heilbron and Prinstein, 2010). However, both studies examined only the direct association of PR with NSSI and not its potential moderating role.

For sake of clarity, it is important to specify that PR and peer victimization are not two overlapping constructs. While victimization refers to the personal experience of being bullied by one or more peers, PR refers to being disliked by many school classmates (Perry et al., 1988). According to the literature, both bullies and victims are generally more rejected by peers than not-involved (Sentse et al., 2015). Whether a bully or a victim is disliked by peers has been hypothesized to depend on the individual lack of social skills and social competence (Sentse et al., 2015), or on specific classroom norms of behavior (Sentse et al., 2007). Indeed, being a bully could be related to low levels of rejection in high-risk contexts or in classrooms with high levels of bullying. Similarly, victims could be less rejected and well-integrated in contexts where aggression is not normative.

1.3. The present study

No study, to our knowledge, has investigated whether and how bullying involvement and PR interact in predicting adolescent engagement in NSSI. Accounting for these relations could be crucial to better understand the conditions that make a bully, a victim or a bully-victim more vulnerable to engage in NSSI, also increasing our knowledge about the functions served by NSSI (Bentley et al., 2014).

Against this background, we hypothesized that: i) bullying involvement (as a bully, a victim, or a bully-victim) and PR will directly predict NSSI involvement at least once, and NSSI frequency once initiated, and ii) PR moderates the relationships between bullying role and NSSI, namely the probability of NSSI will be amplified when bullying participants are also rejected. Since previous studies evidenced that females are generally more involved in NSSI compared to males (e.g., Giletta et al., 2012), and that engagement in NSSI generally tends to decrease over time (e.g., Barrocas et al., 2014), potentially confounding effects of adolescent gender and age will be considered.

2. Method

2.1. Participants and procedures

Participants were 640 adolescents attending a vocational or academic high school located in the metropolitan area of Naples, in the Southern Italy (253 Males, M_{age} = 15.60, SD = 1.65). Overrepresentation of females in the sample was mainly due to gender imbalance in favor of females in the academic high school, where the enrolment of girls generally exceeds the boys (Ministry of Education, University and Research - MIUR, 2017). Data collection took place in Spring 2016 and was conducted during regular class hours by trained assistants. Students that were absent during the first collective administration of the questionnaires were invited to complete the questionnaire at a later date, within the school setting and during school hours. Parents' and adolescents' written informed consent was obtained prior to the administration of paper-and-pencil questionnaires.

Table 1
Descriptive statistics.

Characteristics	Total (N = 640)	Adolescent gender Males (n = 253)	Females (n = 387)		Adolescent school grade 9th grade (n = 356)	12th grade (n = 284)	
Age (M ± SD)	15.60 ± 1.65	15.48 ± 1.71	15.70 ± 1.62		14.24 ± .60	17.31 ± .68	
Bullying roles n (%)							
Bully	74 (11.6)	35 (13.8)	39 (10.1)	$\chi2$ (3) = 30.78,	50 (14)	24 (8.5)	$\chi2$ (3) = 7.73,
Victim	99 (15.5)	38 (15)	61 (15.8)	$p \leq .001$	57 (16)	42 (14.8)	$p = .052$
Bully-victim	138 (21.6)	79 (31.2)	59 (15.2)		81 (22.8)	57 (20)	
Others	329 (51.4)	101 (39.9)	228 (58.9)		168 (47.2)	161 (56.7)	
Engagement in NSSI at least once n (%)							
Yes	98 (15.3)	37 (14.6)	61 (15.8)	$\chi2$ (1) = .15,	69 (19.4)	29 (10.2)	$\chi2$ (1) = 10.25,
No	542 (84.7)	216 (85.4)	326 (84.2)	$p = .69$	287 (80.6)	255 (89.8)	$p \leq .001$

2.2. Measures

2.2.1. School bullying

Self-report measures of bullying and victimization were collected by using an adapted version of the classical bully-victim questionnaire by Olweus (1996). Participants responded to nine items for victimization and nine for perpetration rated on a 5-point scale concerning how frequently (1 = *never* to 5 = *several times a week*), during the last six months, they had bullied others or been bullied (Cronbach's αs = .84 and .85 and McDonald's ωs = .86 and .85, respectively).

2.2.3. Non-suicidal self-injury

NSSI was assessed through a six-item scale (Giletta et al., 2012; Prinstein et al., 2008) measuring how frequently (1 = *never* to 5 = *10 or more times*), during the last six months, adolescents intentionally engaged in several types of self-injurious behaviors without suicidal intentions (such as cutting, burning, or hitting oneself). As we were interested in NSSI frequency, a composite score of NSSI was obtained by averaging all items ratings in line with prior research (e.g., Giletta et al., 2012; Prinstein et al., 2008). Although this composite NSSI measure did not distinguish across different NSSI forms, the psychometric properties of the scale provided support for combining the different NSSI forms into an overall measure, Cronbach's alpha = .86, McDonald's omega = .88. Inter-item correlations ranged from .37 (between "cutting or carving skin" and "burning skin") to .72 (between "burning skin" and "self-biting").

2.2.4. Peer rejection

Peer nominations were used to assess rejection by peers within the classroom. Specifically, each participant was asked to nominate up to four classmates whom he/she dislikes; the nominations received by each participant were summed and divided by the number of nominators to obtain a proportion score (e.g., Hodges and Perry, 1999). A square root transformation was applied to obtain normalized scores.

2.3. Analytical strategy

Participants were coded as bullies, victims, bully-victims, or neither victims nor bullies (not-involved) based on their self-reported bullying and victimization experiences. To define these four categories, we used the cut-off of "two to three times a month" or more, according to the standard procedure (Solberg and Olweus, 2003). That is, we categorized as bullies all students who reported to have bullied their classmates two or three times a month or more often, and to have been bullied by their classmates lesser than two or three times a month; as victims all students who reported to have been bullied by their classmates two or three times a month or more often, and to have bullied their classmates lesser than two or three times a month; as bully-victims all students who reported to have been both bullies and victims at least two or three times a month; as not-involved all students who reported to have being involved in bullying episodes, as bullies or victims, lesser than two or three times a month.

To examine the associations of bullying roles and PR with the probability of engaging in NSSI, as well as the frequency of NSSI once initiated, we conducted zero-inflated Poisson (ZIP) regression analyses in Mplus 7.2 (Muthén and Muthén, 2012). This regression is particularly suitable for analyzing count data with excess zeros, such as the frequency of NSSI in community samples (Lambert, 1992). In this regression, the occurrence of the count dependent variable and the frequency of it once initiated are examined simultaneously. Two ZIP regression models were run to analyze main and interactive effects of bullying roles and PR, respectively, controlling for adolescent age and gender. Bullying roles were entered into the ZIP model as a multi-categorical independent variable (bully, victim, bully-victim, others). The indicator coding system with "not-involved" as the reference group was adopted to represent the multi-categorical variable of bullying categorization (Hayes and Montoya, 2017). Significant conditional effects were probed by using the pick-a-point approach (Aiken and West, 1991). Inferential tests were based on 95% confidence intervals.

3. Results

3.1. Descriptive statistics and preliminary analyses

Descriptive statistics of the sample are reported in Table 1. Participants who were coded as bullies were 74, victims were 99 and bully-victims were 138. Participants who reported to have been neither bullies nor victims were 329. Ninety-eight adolescents (15.3% of the total sample) self-reported to engage in NSSI at least once or twice. About 63% of adolescents (N = 64) who self-injured engaged in NSSI three times or more. The results of a preliminary ANCOVA controlling for adolescent age and gender revealed no significant differences in scores of PR between bullying groups, $F(3, 634) = 1.51$, $p = .21$, $\eta^2 = .01$.

3.2. Zero-inflated Poisson regression

Table 2 shows the main and interactive effects resulted from the ZIP regression models. As can be observed, the analyses revealed that being a bully independently by PR increased the probability of engaging in NSSI in comparison with the reference group (*others*), whereas being a bully-victim and a victim interacted with PR on the probability of engagement in NSSI. As depicted in Fig. 1, victims were more likely to display NSSI at medium, $B = 1.15$, $p \leq .001$, 95% CI [.48, 1.81], and high levels of PR, $B = 1.73$, $p \leq .001$, 95% CI [.78, 2.68], with respect to the reference group. The bully-victim group showed a greater probability of engaging in NSSI only at high levels of PR, $B = .90$, $p \leq .05$, 95% CI [.14, 1.66]. Finally, no moderating effects of bullying roles and PR were found on the frequency of NSSI once initiated. Conversely, only being a bully and being a victim were significantly associated with increasing of the frequency of NSSI, independently by PR.

Table 2
Summary of the zero-inflated Poisson regression analyses. Main and interactive effects of bullying roles and peer rejection on the probability to engage in NSSI and frequency of NSSI once initiated. $N = 640$.

Predictors	Probability of NSSI			Frequency of NSSI		
Main effects	*B*	*S.E.*	[95% CI]	*B*	*S.E.*	[95% CI]
Age	−.13	.07	[−.27; .01]	−.06	.08	[−.22; .11]
Gender	.22	.25	[−.27; .70]	−.01	.24	[−.49; .47]
Peer rejection	.02	.01	[.00; .05]	.02	.01	[−.002; .03]
Being bully	1.16***	.34	[.50; 1.82]	.91**	.31	[.29; 1.52]
Being victim	.95**	.32	[.33; 1.57]	.56*	.29	[−.001; 1.12]
Being bully-victim	.47	.31	[−.13; 1.08]	.52	.30	[−.07; 1.12]
Interactions						
Being bully X peer rejection	.08†,	.04	[−.01; .16]	.01	.04	[−.06; .09]
Being victim X peer rejection	.10*	.04	[.02; .18]	.01	.03	[−.04; .06]
Being bully-victim X peer rejection	.07*	.03	[.01; .13]	−.01	.02	[−.05; .04]

Note. Unstandardized coefficients for main and interactive effects.
Gender: 0 = male, 1 = female.
† $p < .10$,
*** $p < .001$,
** $p < .01$,
* $p < .05$.

4. Discussion

The aim of the current study was to investigate the direct and interactive role of school bullying involvement and PR on the probability of engaging in NSSI at least once, and on the frequency of NSSI episodes once initiated in a sample of Italian non-clinical adolescents. Prevalence rates reported in this study were consistent with previous research on NSSI in non-clinical samples (e.g., Muehlenkamp et al., 2012; Swannell et al., 2014), reporting a prevalence estimate of approximately 17% in adolescents.

In line with the model proposed by Nock (2009) and later research (Latina and Stattin, 2016), according to which relational dynamics are relevant factors contributing to adolescent NSSI, our results indicate that being involved in school bullying is a risk factor for engagement in NSSI, at least once and repeatedly over time once initiated. With respect to the role of PR, we found that being rejected by peers amplified the likelihood to engage in NSSI at least once only in victims and bully-victims, thus suggesting that PR might play a key role in making victims and bully-victims more vulnerable to use NSSI. Once initiated, the frequency of NSSI episodes was independent by PR.

Why bullies, victims and bully-victims use NSSI? Are there different mechanisms linking bullying involvement and NSSI, since all are at higher risk than others, but under different conditions of PR? Overall, the interrelated effect of PR and bullying involvement on NSSI would support the hypothesis that NSSI functions in victims and bully-victims as a means to cope with one's negative emotional states (intrapersonal function), which seem to be amplified by being rejected by peers. Since PR is associated with poor social skills, we hypothesize that NSSI also could serve to evoke attention from others and promote help-seeking behaviors in absence of sufficient communication skills to appropriately express themselves (interpersonal function).

As concerns being involved in bullying as a perpetrator, we found that, independently by levels of PR, it was a risk factor for engaging in NSSI, at least once and repeatedly over time. Similarly, other studies in the literature have found antisocial behavior and aggression (Moran et al., 2012) to be precursors of self-harm during adolescence,

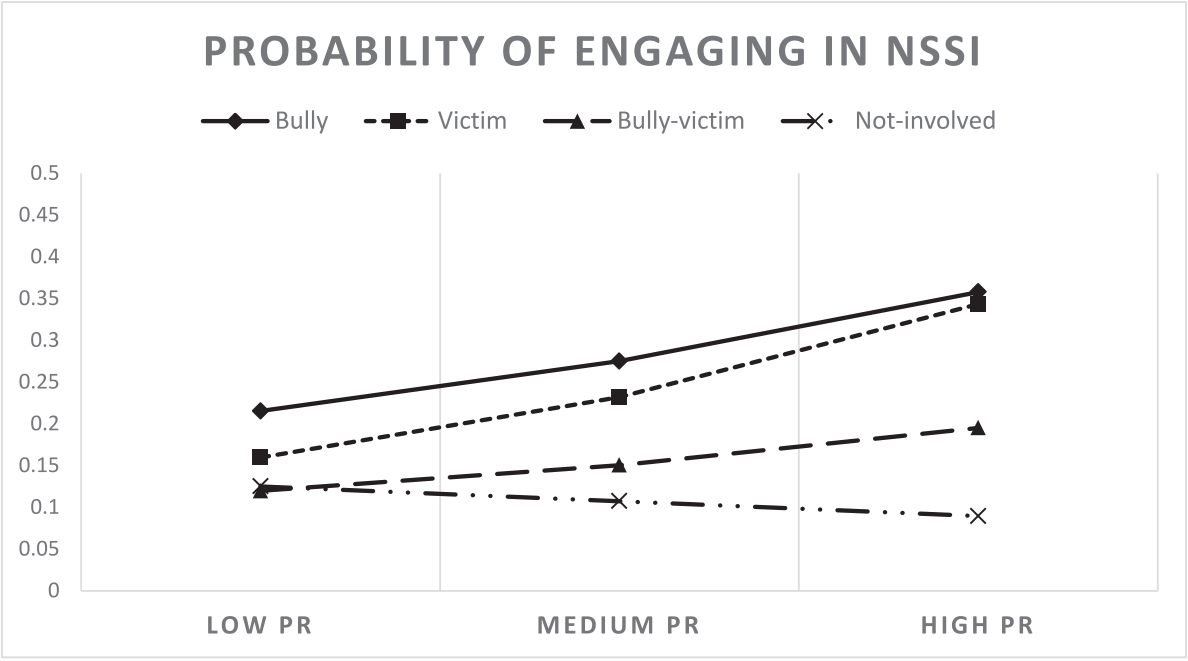

Fig. 1. Interaction between bullying roles and peer rejection (PR) on the probability of engaging in NSSI.

but the mechanisms underlying these relationships are still unclear. One possible reason might lie in the tendency of individuals with externalizing behaviors, as bullies could be considered, to engage in impulsive, sensation-seeking and risk-taking behaviors, which would increase their likelihood to use self-harm; the function of NSSI, in this case, might be to generate positive feelings or stimulation, in the sense of an intrapersonal-positive reinforcement (Nock, 2009). Further studies are needed to deepen what does link bullying perpetration and NSSI.

Finally, neither age nor gender was found to be significantly associated with NSSI. This result seems to be in contrast with previous research finding that girls and younger adolescents are more likely to self-injury than are boys and older adolescents (Barrocas et al., 2014; Giletta et al., 2012). However, there are studies in the literature indicating that those differences in NSSI prevalence across gender and age groups are more modest than expected (Tyler et al., 2003) and still remain unclear (Yates et al., 2008). It is also noteworthy that previous studies using NSSI behavior as an outcome of zero-inflated Poisson regression analyses did not find significant effects of gender or age (e.g., You et al., 2016). We could argue that, although differences exist between gender and age groups in NSSI frequency, those differences do not regard the probability of engaging NSSI at least once and the frequency of NSSI once initiated.

4.1. Limitations and conclusion

Although limited by a cross-sectional research design, that prevents us from drawing conclusions about the causality direction of effects, our results are encouraging. Based on a peer rated measure of rejection, which is the major strength of the study, our findings support the hypothesis that peer relationships, in terms of school bullying and peer rejection, play a key-role in determining NSSI and, thus, the importance to implement programs aimed to improve the school climate in order to avoid maladjusted behaviors in adolescence. Comprehensive, school-wide programs designed to change group norms, strengthen individual coping abilities or self-regulation skills would all improve relationships within the peer group, reducing the risk for adolescents to engage in NSSI. Furthermore, our results highlight the need, for future research, to deepen the investigation of environmental contributors of NSSI and their interaction to clarify whether NSSI develops because of multiple interrelated risk factors or whether there are predominant vulnerabilities, as well as to increase our understanding of the individual functions associated with NSSI.

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