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Non-suicidal self-injury among Dutch and Belgian adolescents: Personality, stress and coping

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ABSTRACT

Background: This study examines: (1) the prevalence of Non-Suicidal Self-Injury (NSSI) among Dutch and Belgian adolescents, (2) the associations between Big Five personality traits and NSSI engagement/versatility (i.e., number of NSSI methods), and (3) whether these associations are mediated by perceived stress and coping.
Methods: A total of 946 Flemish (46%) and Dutch (54%) non-institutionalized adolescents (Mean age = 15.52; *SD* = 1.34, 44% females) were surveyed. Measures included the NSSI subscale of the Self-Harm-Inventory, the Dutch Quick Big Five Personality questionnaire, the Perceived Stress Scale and the Utrecht Coping List for Adolescents. Examination of zero-order correlations was used to reveal associations, and hierarchical regression analysis was used to reveal potential mediators which were further examined within parallel mediation models by using a bootstrapping-corrected procedure.
Results: Lifetime prevalence of NSSI was 24.31%. Neuroticism; perceived stress; and distractive, avoidant, depressive, and emotional coping were positively associated with NSSI engagement, whereas Agreeableness, Conscientiousness; and active, social, and optimistic coping were negatively associated with NSSI engagement. Observed relationships between personality traits and NSSI engagement were consistently explained by perceived stress and depressive coping. A higher versatility of NSSI was not associated with any Big Five personality trait, but was associated with higher scores on perceived stress and depressive coping and with lower scores on active and optimistic coping.
Conclusion: Our study suggests that a specific personality constellation is associated with NSSI engagement via high stress levels and a typical depressive reaction pattern to handle stressful life events.

1. Introduction

Non-suicidal self-injury (NSSI) refers to the deliberate and direct injury to one's own body surface without suicidal intent, and includes behaviors such as cutting, scratching and burning the skin [19,53]. NSSI typically starts and peaks in adolescence [37,58]. A recent meta-analysis estimated a pooled lifetime prevalence of 26.70% when specifically investigating NSSI methods, and demonstrated equivalent NSSI engagement across gender [64]. However, methods of NSSI have been suggested to be different between the two sexes, with females more likely to engage in self-cutting or self-scratching, and males more likely to engage in self-hitting, self-burning and head banging [3,7,8,9,69]. Because NSSI poses a health concern among youth worldwide [50,64], a deeper understanding of this destructive behavior is highly needed. The latter was recently emphasized in *DSM-5*, with the new inclusion of Non-Suicidal Self-injury Disorder as a "condition requiring further study" [6,72]. From previous studies, it is known that NSSI is more common in people with mental disorders (specifically mood disorders) [34,55], those with a history of childhood adversities [49], or those with suicidal ideation [25]. However, most people with these risk factors alone do not engage in NSSI. There is evidence that personality traits also contribute to problem behaviors [40], and that certain personality traits are related to NSSI engagement. Previous research with the Big Five personality model – which is a valid way to differentiate

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individuals [47] – suggested that self-injurers score higher on Neuroticism and Openness to experience, and lower on Agreeableness and Conscientiousness than their peers without NSSI [14,18,30,42]. Furthermore, NSSI versatility (i.e., number of NSSI methods), which can be considered as a measure of NSSI severity [55,63], was also associated with more Openness to experience and less Conscientiousness [60]. Moreover, self-injurers were found to be more likely to have a personality disorder (specifically cluster B) [20,55]. However, although research has consistently shown relations between personality and NSSI, it is unclear why this relation may exist.

Adolescence is a potential stressful period with important biopsychosocial changes taking place; adolescents are thus confronted with several challenges in their psychological functioning (e.g., separation from the parental environment) [4]. In a transactional approach, personality is assumed to influence the amount of stress individuals experience [41]. Individuals with high scores on Neuroticism are expected to experience more stress, whereas those with high scores on the other Big Five personality traits will experience less stress on a daily basis [5,31,56,68]. Besides the influence on perceived stress, a transactional model also assumes that personality affects the coping strategies to get over stressful events [41]. A meta-analysis by Connor-Smith and Flachsbart [24] found that, in general, neurotic individuals express negative emotions and use avoidance-oriented coping such as withdrawing from stressful situations. Furthermore, individuals with high scores on Agreeableness and Conscientiousness were more likely to use approach-oriented coping strategies (like cognitive restructuring or problem solving). Emerging evidence is suggesting that perceived stress and coping may mediate the relationship between personality and psychopathological symptoms [12,16,70,71]. Interestingly, NSSI engagement was already found to be associated with more perceived stress [27], and more emotional and avoidance-oriented coping [2,15,17,26,33]. However, so far, no study has investigated the role of perceived stress and coping as factors potentially underlying the relationship between personality and NSSI engagement/versatility, leaving an important gap in the existing knowledge on potential pathways leading to NSSI.

In order to address these limitations, the purpose of the present study was to examine the relationship between personality, perceived stress, coping and NSSI engagement/versatility. Therefore, the aims of this study were threefold. First, to examine the lifetime prevalence and methods of NSSI in a sample of Flemish and Dutch adolescents. Second, to examine associations between personality traits, perceived stress, coping, and NSSI engagement/versatility. Third, to examine perceived stress and coping strategies as factors potentially underlying the relationship between personality traits and NSSI engagement/versatility.

2. Methods

2.1. Procedure

The target population was Dutch and Belgian adolescents in the 8th to 12th grade. After obtaining ethical approval, participants were recruited from classes in grades 8 through 12 (convenience sampling, i.e., each school board decided their participation rate) across 6 randomly selected high schools located in different areas of the Flemish-speaking part of Belgium and in the Netherlands. An average of 159 pupils per school participated (range 41–296). The parents of selected participants were informed about the nature of the survey through a letter sent home, and no parents refused participation of their child. However, a potential bias due to absenteeism on the days the survey was administered cannot be excluded. Pupils signed an informed consent form, which emphasized the confidentiality, the background of the study, and the voluntary nature of participation. All adolescents who were present agreed to participate and completed a paper-and-pencil survey of approximately 30–40 minutes. After completing the survey, forms were returned in sealed envelopes. Adolescents were not compensated for their participation.

2.2. Subjects

One thousand thirteen adolescents provided data. Sixty-seven cases were excluded because they gave no answer on the NSSI questions, with the excluded cases being more likely male, younger, and less neurotic, open to experience, agreeable and conscientiousness than the included cases (all $P < .05$; data on request). The final sample consisted of 508 Dutch and 438 Flemish-speaking Belgian adolescents, of whom 408 were female and 511 were male (27 did not provide information about their gender). The mean age was 15.52 years ($SD = 1.34$, range 12–19 years), with boys [$M(SD) = 15.64(1.33)$] being slightly older than the girls [$M(SD) = 15.37(1.33)$, $F_{1,874} = 9.01$, $P = .003$]. Of the 946 high school pupils, 105 were 8th graders, 179 9th graders, 210 10th graders, 287 11th graders and 151 12th graders (14 did not provide their grade). Given that some participants had missing values on at least one of the independent study variables, the mediation analyses were run on 819 high school pupils (i.e., listwise deletion), who were older, more neurotic, less open to experience, experienced more stress and used more distractive coping than the cases with item-missingness (all $P < .05$; data on request).

2.3. Instruments

2.3.1. Non-suicidal self-injury

The NSSI subscale of the Self-Harm-Inventory was used to assess the presence of prior NSSI [62]. Participants were asked in a yes/no question format whether they had "ever intentionally, or on purpose" engaged in seven self-injurious methods without suicidal intent (i.e., cutting oneself, burning oneself, hitting oneself, head banging, scratching, preventing wounds from healing or others). Engagement in NSSI was considered affirmative, when participants indicated to have engaged at least once in one of the specified behaviors. Kuder-Richardson coefficient (KR-20) provided an internal consistency of 0.70 for the current sample. Besides the lifetime prevalence of the specified behaviors, participants also indicated the age of onset of NSSI and NSSI versatility, which was calculated by counting the number of methods endorsed by self-injuring participants, ranging from 1 to 7. Although the absolute skewness of 1.73 was not considered problematic [39], NSSI versatility was log10-transformed to increase normality.

2.3.2. Personality

Personality traits were assessed by means of the Dutch Quick Big Five Personality questionnaire [67], a shortened Dutch translation of Goldberg's original 100 item-adjective list [29]. Each personality disposition is measured by 6 adjectives. Examples of items are "nervous" (i.e., Neuroticism), "talkative" (i.e., Extraversion), "creative" (i.e., Openness to experience), "pleasant" (Agreeableness), and "accurate" (Conscientiousness). Participants indicated, on a 7-point Likert scale, to what extent the adjectives applied to them. Composite scores ranged from 1 to 7, with higher scores indicative of higher levels of the specific trait. Because the scales appeared to correlate with criterium variables such as depressive feelings, convergent validity is suggested to be good [67]. In this sample, Cronbach's alpha coefficients were: .83 for Neuroticism, .73 for Extraversion, .84 for Openness to experience, .84 for Agreeableness and .87 for Conscientiousness.

2.3.3. Stress levels

To assess the experience of stress, participants completed the Perceived Stress Scale, which is the most widely used instrument for measuring the perception of overall stress. The PSS-10 is a short questionnaire consisting of 10 questions [23], which measures the extent to which participants consider their lives to be unpredictable, uncontrollable and overloaded (e.g., "In the last month, how often have you been upset because you were unable to control important things in your life"). Individuals rate their responses to each item on a 5-point Likert-type scale, with a higher composite score in the range from 1 to 5 indicative of greater perceived overall stress. The PSS-10 total score was demonstrated to have a good convergent validity because the scale appeared to correlate with criterium variables such as trait anxiety [59]. In our sample, the Cronbach's alpha coefficient of the PSS-10 was .84.

2.3.4. Coping

The Utrecht Coping List for Adolescents (UCL-A) was used to assess coping strategies [10]. The UCL-A consists of a 47-item questionnaire that measures seven types of coping strategies in day-to-day situations on a 4-point Likert scale. The instrument focuses on active (e.g., "When I have a problem, I deal with it right away"), distractive (e.g., "When I have a problem, I keep myself busy with other things"), avoidant (e.g., "I try to avoid the problem"), social (e.g., "When I have a problem, I share it with others"), depressive (e.g., "When I have a problem, I become overwhelmed by it"), emotional (e.g., "When I have a problem, I respond to the tension by getting angry at others"), and optimistic coping (e.g., "When I have a problem, I think that everything will turn out all right"). Composite scores range between 1 and 4, with higher scores meaning that the specific coping strategy is more frequently used in handling stressful life events. In this sample, Cronbach's alpha coefficients were: .73 for active coping, .74 for distractive coping, .67 for avoidant coping, .87 for social support seeking, .74 for depressive coping, .66 emotional coping and .69 for optimistic coping. The UCL-A is used by multiple studies [44,51], indicative that this scale provides meaningful information about adolescents' typical coping strategies.

2.4. Statistical analyses

Descriptive statistics are reported for the primary study variables. The Chi^2 statistic was used to compare different NSSI methods between girls and boys. All independent continuous variables were standardized. Associations between personality traits, perceived stress, coping and NSSI engagement/versatility were evaluated using Pearson (point-biserial) zero-order correlations. Using hierarchical (logistic) analysis, perceived stress and coping strategies were examined as potential mediators (controlling for gender and age) in the association between personality and NSSI engagement/versatility. Based on these results, parallel mediation models using a bootstrapping procedure with 10,000 bootstraps were run with potential mediators [35]. Results were again controlled for age and gender, as well as all other Big Five personality traits. This non-parametric resampling procedure is considered superior to the traditional Baron and Kenny approach [36], and has been shown to best reduce type I errors, while maximizing statistical power [13]. Given multiple testing of indirect effects, α was set at .01 so point estimates with 99% bootstrap-corrected confidence intervals (BCI) were calculated. Results indicate a significant indirect effect if the BCI did not contains zero. All analyses were performed with SPSS 22.0 and a macro (i.e., PROCESS v2.13 [35]).

3. Results

3.1. Lifetime prevalence and NSSI characteristics

Approximately one in four [N = 230, or 24.31%] reported lifetime NSSI, with no significant gender [$Chi^2_{(1)} = 0.01$, $P = .95$] or national variation [$Chi^2_{(1)} = 0.01$, $P = .94$]. Girls were more likely to report scratching [$Chi^2_{(1)} = 9.89$, $p = .002$, $V = .10$] and cutting [$Chi^2_{(1)} = 13.24$, $P < .001$, $V = .12$], whereas boys were more likely to report head banging [$Chi^2_{(1)} = 7.08$, $P = .008$, $V = .09$] (Table 1). Mean age of onset of NSSI was 12.6 years ($SD = 2.4$), with the interquartile range between 11 and 14 years. Average NSSI versatility was 1.96 ($SD = 1.25$, range 1–7), with 47.75% using one NSSI method, 27.93% using two NSSI methods, 13.06% using three NSSI methods and 11.26% using four or more NSSI methods (of which 16% engaged in all the specified behaviors). The mean age of onset and mean NSSI versatility did not differ between male and female participants.

3.2. Associations between personality traits, perceived stress, coping and NSSI

NSSI engagement was associated with higher Neuroticism, perceived stress, and more distractive, avoidant, depressive and emotional coping; and with lower Agreeableness, Conscientiousness, and less active, social, and optimistic coping (Table 2). Extraversion and Openness to experience were not significantly associated with NSSI engagement. A binary logistic regression analysis revealed that no personality trait was significantly associated with NSSI engagement above and beyond perceived stress and coping strategies (Table 3). Perceived stress and distractive, social and depressive coping were revealed as potential mediators, because these transactional constructs were associated with NSSI engagement above and beyond the Big Five personality model (Table 3). NSSI versatility was not significantly associated with any of the Big Five personality traits, but was associated with higher scores on perceived stress ($r = .13$; $P = .049$) and depressive coping ($r = .20$; $P = .004$), and with lower scores on active ($r = -0.15$; $P = .027$) and optimistic coping ($r = -0.16$; $P = .018$). When controlling for the other associated variables, only depressive coping remained borderline significant ($r_p = .14$, $P = .050$).

3.3. Perceived stress and coping as mediators between personality and NSSI engagement

The positive association between Neuroticism and NSSI engagement was fully mediated by perceived stress and coping (Fig. 1a). Higher levels of Neuroticism were associated with higher perceived stress and higher use of depressive coping, which in turn were positively associated with NSSI. Neurotic adolescents also had a higher use of social support seeking, which was in contrast negatively associated with NSSI, and thus partially suppressed the general positively mediated association between Neuroticism and

Table 1
Endorsement of NSSI methods.

Method	N_{total}	$\%_{total}$	N_{boys}	$\%_{boys}$	N_{girls}	$\%_{girls}$
Head banging	122	12.90	81	15.91	40	9.90
Hitting oneself	94	9.94	50	9.78	43	10.59
Scratching oneself	85	8.99	33	6.51	51	12.56
Preventing wounds to heal	63	6.66	32	6.32	28	6.93
Cutting oneself	59	6.24	19	3.72	39	9.61
Burning	23	2.43	15	2.94	7	1.72
Other	10	1.06	6	1.43	4	1.22

NSSI: Non-Suicidal Self-Injury. $N_{total} = 946$; $N_{boys/girls} = 421–511$.

Table 2
Correlations between age, gender, NSSI engagement, Big Five personality traits, perceived stress and coping.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Age	1	−.10**	−.04	.11**	−.08*	.03	.10**	−.07*	.10**	.05	.11**	−.03	.01	.05	.05	.09*
2. Gender (female)		1	−.01	.27***	.02	.04	.13***	.23***	.23***	−.18***	.10**	−.06	.16***	.16***	.02	.06
3. NSSI engagement			1	.09**	−.04	−.01	−.10**	−.10**	.28***	−.10**	.12***	.13***	−.08*	.32***	.17***	−.09**
4. Neuroticism				1	−.42***	.04	.09**	.10**	.49***	−.21***	.12***	.10**	.08*	.43***	.15***	−.02
5. Extraversion					1	.08*	.08*	−.10**	−.26***	.14***	−.01	−.30***	.26***	−.31***	.09**	.08*
6. Openness for experience						1	.40***	.21***	−.10**	.23***	.16***	−.02	.09**	−.02	.03	.20***
7. Agreeableness							1	.29***	−.14***	.17***	.20***	−.03	.12**	−.14***	−.11**	.22***
8. Conscientiousness								1	−.09**	.13***	−.01	−.11**	.09*	−.07*	−.12***	.05
9. Perceived stress									1	−.37***	.12***	.13***	−.07*	.65***	.26***	−.21***
10. Active coping										1	.19***	.02	.27***	−.19***	−.03	.43***
11. Distractive coping											1	.30***	.22***	.28***	.18***	.46***
12. Avoidant coping												1	−.12***	.33***	.06	.18***
13. Social coping													1	−.00	.21***	.26***
14. Depressive coping														1	.29***	−.06
15. Emotional coping															1	−.04
16. Optimistic coping																1

NSSI: Non-Suicidal Self-Injury.
*P < .05, **P < .01, ***P < .001.

NSSI. The negative associations between Agreeableness and NSSI (Fig. 1b) and Conscientiousness and NSSI (Fig. 1c) were fully mediated by perceived stress and depressive coping. Higher levels of Agreeableness and Conscientiousness were associated with less perceived stress and less use of depressive coping, which were in turn positively associated with NSSI.

4. Discussion

The present study confirmed and expanded previous knowledge on NSSI. About one in four Dutch and Belgian adolescents reported to have engaged in NSSI at least once in their life. Higher levels of Neuroticism and lower levels of Agreeableness and Conscientiousness were found to be uniquely associated with NSSI engagement, and perceived stress and depressive coping were found to be the potential underlying factors of these associations. NSSI versatility was not associated with any personality trait, but appeared associated with depressive coping.

The first aim of the study was to examine the lifetime prevalence among a European sample of adolescents. The high prevalence of NSSI engagement (24.31%) among adolescents, is in line with earlier findings [50,64]. Self-injurers reported an age of onset typically between 11 and 14 years, which is a consistent finding across clinical and community-based samples [37]. NSSI engagement was also equally present among the Dutch and Belgian youth, confirming most prior international comparisons [28,57]. Furthermore, NSSI engagement was equally present among girls and boys, with girls more likely to have engaged in scratching and cutting themselves and boys more likely to have engaged in head banging [3,7,8,9,69].

Table 3
Hierarchical logistic regression analysis for variables predicting engagement in non-suicidal self-injury.

	β*	S.E.	OR	95% CI
First step				
Neuroticism	**.27****	**.10**	**1.32**	**1.09–1.59**
Extraversion	−.01	.09	.99	.83–1.18
Openness to experience	.16	.10	1.17	.98–1.41
Agreeableness	**−.31****	**.10**	**.73**	**.60–0.89**
Conscientiousness	**−.20***	**.09**	**.82**	**.68–0.98**
Second step				
Neuroticism	−.04	.11	.96	.77–1.20
Extraversion	.20	.11	1.22	.98–1.52
Openness to experience	.14	.10	1.15	.95–1.41
Conscientiousness	−.17	.11	.85	.68–1.05
Agreeableness	−.08	.10	.93	.77–1.12
Perceived stress	**.37****	**.13**	**1.44**	**1.12–1.86**
Active coping	.00	.11	1.00	.81–1.24
Distractive coping	**.28***	**.11**	**1.32**	**1.06–1.64**
Avoidant coping	.07	.10	1.08	.88–1.32
Social support seeking	**−.25***	**.10**	**0.78**	**.64–.95**
Depressive coping	**.47*****	**.13**	**1.60**	**1.25–2.06**
Emotional coping	.08	.09	1.08	.90–1.30
Optimistic coping	−.21	.11	.81	.65–1.01

S.E.: standard error; OR: odds ratio; 95% CI: 95% confidence interval. All variables are standardized and gender and age are included as covariates.
*P < .05, **P < .01, ***P < .001.

The second and third aim of the study were to examine simple associations between Big Five personality traits, perceived stress, coping and NSSI engagement/versatility, and to examine perceived stress and coping as potential underlying factors between personality and NSSI engagement/versatility. Overall, there are four main findings. First, Extraversion and Openness to experience were not associated with NSSI engagement in our sample, with the latter contradicting most earlier research on NSSI [14,18,30]. Nevertheless, even though the current finding about Openness to experience was not anticipated on the basis of earlier studies on NSSI, it coincides with research demonstrating that Openness to experience is largely unrelated to clinical symptoms [43]. Indeed, in line with a meta-analysis of Connor-Smith and Flachsbart, Openness to experience was positively associated with both approach-oriented (i.e., active coping) and avoidance-oriented coping (i.e., distraction) [24]. Second, Neuroticism was positively associated with NSSI engagement, and Agreeableness and Conscientiousness were negatively associated with NSSI engagement, which is in line with earlier findings [14,18,30,42]. In a similar vein, Baetens et al. [7] documented among community adolescents, and Claes et al. [22] among eating-disordered patients that self-injurers score higher on Negative Affectivity (i.e., prone to the experience of negative emotions and a negative self-concept; highly associated with Neuroticism [52]) and lower on effortful control (i.e., the ability to regulate attention and behavior; highly associated with Conscientiousness [52]) than their peers without NSSI. Apart from Conscientiousness, Agreeableness is also suggested to originate in effortful control [1,16]. Agreeable people make more effort and are better able to control negative affect, whereas conscientious people are better able to down-regulate negative affect [32,38,65]. Altogether, this suggests that adolescents with a specific (borderline; see [61]) personality constellation (high on Neuroticism, low on Agreeableness and Conscientiousness), who are more prone to experience negative affect and stress while having more difficulty managing stressful life events by means of

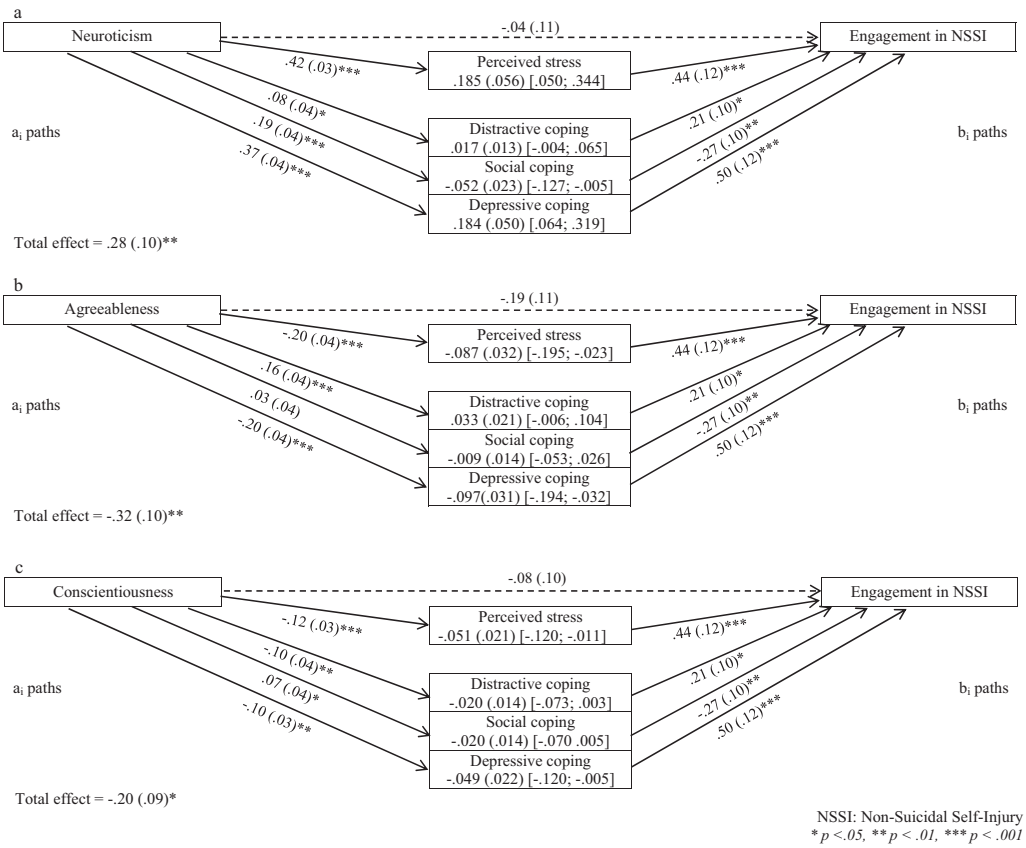

Fig. 1. Parallel Mediation Models between Neuroticism, Agreeableness, Conscientiousness and Engagement in Non-Suicidal Self-Injury via Stress and Coping. Coefficients between parentheses represent standard errors. Direction and magnitude of each potential mediator is depicted together with the 10,000 bootstrap-corrected standard error between parentheses and 99% confidence interval between brackets. Adjusted for age and gender, and all other Big Five personality traits.

effective coping, are more vulnerable to engage in less adequate behavior such as NSSI. Indeed, our findings suggest that adolescents who are personality-based predisposed to appraise their lives as more unpredictable, uncontrollable and overloaded while typically displaying a depressive reaction pattern to get over increased stress levels, are at greatest risk for NSSI engagement. Taken together, our findings also support the reported association between NSSI and the cluster B borderline personality disorder [20,42,55]. Third, depressive coping was found to be the dominant coping strategy explaining the associations between personality traits and NSSI engagement. However, it is important to note that coping strategies such as depressive coping will also be determined by environmental factors such as family and peer support [see 48]. Thus, especially adolescents with the vulnerable personality constellation *and* poor social resources are expected to lack coping skills to adequately deal with stressful events, thereby increasing their risk to engage in NSSI as an emotion regulation strategy [54]. Fourth, in contrast to earlier findings [60], NSSI versatility was not related with any personality trait. The latter suggests that personality may contribute more to the risk for NSSI initiation, than in determining NSSI severity. Moreover, the fact that depressive coping appeared uniquely associated with NSSI versatility illustrates that coping cannot just be seen as personality in action.

Our findings should be interpreted in light of the following limitations. First, because of the cross-sectional study design we were unable to fulfill the temporal precedence criterion of causality between the constructs, which might have biased our findings [45,46]. However, prior research has supported the notion that personality influences perceived stress and the typical coping strategies to deal with stressors [11,16,68]. Our findings strongly suggest that increased stress levels and depressive coping, in turn, will be predictive for NSSI engagement among adolescents. In support of this idea, emerging evidence suggests that psychological distress such as depressive feelings are not only discriminating between self-injuring adolescents and their peers without NSSI, but also predict NSSI onset [34]. Furthermore, dysfunctional coping was recently also found to be prospectively related with NSSI chronicity and severity [66]. However, it is up to future prospective research to refute or confirm our findings, and to expand the framework by also focusing on environmental and situation-specific factors in the transactional process. Second, it is not clear to what extent our results would generalize to clinical populations. Therefore, further research should attempt to replicate our findings in clinical samples [21]. Third, future research should also focus on the facet levels of personality traits to allow a more fine-grained examination [42], yielding more exact insight into the underlying factors between personality and NSSI.

5. Conclusion

The most important finding is that this study suggests that a specific personality constellation in adolescence is associated with NSSI engagement via increased stress levels and a typical depressive reaction pattern to handle stressful life events. From a clinical perspective, this implies that focusing on better stress management and learning more adaptive coping strategies should be considered important in *any* treatment or prevention program for NSSI.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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