



Adolescent non-suicidal self-injury: A cross-national study of community samples from Italy, the Netherlands and the United States

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ABSTRACT

This study examined rates and correlates of non-suicidal self-injury (NSSI) across three non-clinical adolescent samples from different countries. Surveys were administered to 1862 adolescents ($M_{\text{age}} = 15.69$, $S.D. = 0.87$) from Italy ($n = 827$), the Netherlands ($n = 675$), and United States ($n = 360$), including measures of NSSI, substance use, internal (i.e., depressive symptoms, loneliness), and interpersonal factors (i.e., peer victimization, peer preference). After controlling for socio-demographic differences, similar prevalence of NSSI was found across the three samples, with approximately 24% of the adolescents reporting at least one NSSI episode within the last year. Multivariate logistic regressions showed that adolescents' victimization and higher levels of depressive symptoms and family-related loneliness were associated concurrently with NSSI comparably in all three samples. However, multi-group analyses indicated that the association between NSSI and substance use varied significantly across samples, indicating that NSSI related more strongly to substance use (i.e., cigarette smoking and frequent marijuana use) in the sample from the United States rather than the samples from the Netherlands and Italy. Findings provide evidence of NSSI and suggest high similarities in rates and correlates across samples from different countries. Future research should further explore NSSI cross-nationally.

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1. Introduction

Non-suicidal self-injury (NSSI), defined as the socially unacceptable, direct, deliberate destruction of one's own body tissue without suicidal intentions, has been recently shown to be a widespread phenomenon among adolescents in several Western countries (Heath et al., 2008). An increasing number of studies from North America (Canada and United States) (e.g., Ross and Heath, 2002; Laye-Gindhu and Schonert-Reichl, 2005; Lloyd-Richardson et al., 2007) have reported that NSSI is not only related to psychiatric disorders (e.g., borderline personality disorders, anorexia nervosa), but also involves approximately 15% to 20% of non-clinical (i.e., community) adolescents (Heath et al., 2008). Evidence about adolescent self-injury (with or without suicidal intents) has been provided also outside North America, with studies conducted in Europe, primarily in the UK (e.g., Hawton et al., 2002; O'Connor et al., 2009) and Scandinavian countries (e.g., Lundh et al., 2007; Bjärehed and Lundh, 2008), as well as Australia (e.g., De Leo and Heller, 2004) and Asia (e.g., Matsumoto et al., 2008).

Despite the increasing amount of evidence on self-injury, different definitions and instruments used in the existing studies make it difficult to know the actual extent of the phenomenon across different

cultural contexts. Specifically, while North American studies focused on self-injury according to the aforementioned definition (i.e., NSSI), the majority of the work conducted in Europe adopted a more comprehensive definition of self-injury (i.e., deliberate self-harm; DSH), which includes other forms of self-injurious behaviors, such as self-poisoning (e.g., drug overdose), and in particular does not distinguish between non-suicidal and suicidal behaviors (Rodham and Hawton, 2009). Yet, research has shown substantial differences between NSSI and suicidal self-injurious behaviors, in terms of rates, correlates, as well as functions, suggesting it is important to differentiate between these forms of self-injurious behaviors (Nock and Favazza, 2009; Baetens et al., 2011). Adopting the same definition and methodology in samples from different countries might provide comparable data contributing to extend the existing literature on NSSI.

To date, only three main studies have examined self-injury across different countries using the same assessment method. Two studies found substantial differences across countries with regard to DSH prevalence (the Child and Adolescent Self-harm in Europe – CASE – Study, Madge et al., 2008; Portzky et al., 2008). However, because they adopted a definition of self-injury which includes suicidal behaviors (i.e., DSH), it remains unclear whether such differences pertain to NSSI or, rather, to different rates in suicidal behaviors, as other evidence seems to suggest (Nock et al., 2008). The only study that specifically examined NSSI across nations showed similar prevalence rates in NSSI lifetime rates between German and U.S. adolescents (25.6%

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vs. 23.2%; Plener et al., 2009). Thus, cross-national studies clearly are needed to corroborate this evidence.

Identifying NSSI correlates across different contexts may provide further insight into the understanding of adolescent NSSI. In line with explanatory models of self-injury (for reviews, see Klonsky, 2007; Messer and Fremouw, 2008), several internal and interpersonal proximal factors may be expected to associate with NSSI among non-clinical adolescents. As NSSI may represent a maladaptive strategy for emotion regulation (i.e., automatic function), adolescents may engage in NSSI in order to reduce or avoid their negative emotional states (Nock and Prinstein, 2005; Chapman et al., 2006). Thus, internal distress, such as depressive symptoms and loneliness which are highly prevalent and commonly experienced among non-clinical adolescents (Heinrich and Gullone, 2006; Avenevoli et al., 2008), may be strongly related to NSSI. Prior work supported this hypothesis by showing that adolescents with a history of NSSI reported higher levels of depressive symptoms as compared to adolescents without NSSI experience (e.g., Hilt et al., 2008a; Hankin and Abela, 2011). Yet, although the link between loneliness and self-injury has been widely hypothesized within the existing literature, few studies directly examined it (Nock and Prinstein, 2005; Laskaard et al., 2011). In particular, because adolescents may feel lonely when experiencing poor and unsatisfactory relationships with their peers as well as with their family (Heinrich and Gullone, 2006), and because difficult experiences with both peers (as detailed below) and family (e.g., parental alienation; Yates et al., 2008; Bureau et al., 2010) have been shown to be relevant for self-injury, both peer and family loneliness may uniquely and independently associate with NSSI.

During adolescence, interpersonal relationships with peers assume a central role for adolescents' psychosocial development. Conversely, negative peer relationships, in particular low peer preference (or peer rejection) and victimization, have been shown to be harmful experiences which may lead to different forms of distress and psychopathology (e.g., depression, low self-esteem, and externalizing behaviors; Laird et al., 2001; Lopez and DuBois, 2005). Hence, NSSI may be associated with peer rejection and victimization as it may serve to cope with the negative emotional states arising from these stressful peer experiences (i.e., automatic function). Moreover, the social functions which NSSI also may serve (Nock and Prinstein, 2005) provide an additional rationale for hypothesizing an association with interpersonal stressors. That is, adolescents who are rejected and victimized by their peers may endorse NSSI to communicate with others in order to gain attention or discourage external stimuli. Prior self-injury work paid limited attention to interpersonal stressors, with only a small number of studies showing an association between peer victimization and self-injury (Sourander et al., 2006; Hilt et al., 2008a; Hay and Meldrum, 2010; Jutengren et al., 2011). Moreover, previous studies have never simultaneously investigated the role of internal distress and interpersonal stressors in relation to NSSI using cross-national samples.

An analysis of adolescent health risk behaviors also may contribute to identifying those adolescents at-risk for NSSI. Indeed, adolescents that endorse NSSI may be more likely to engage in other health risk behaviors too. Here, different from internal distress and interpersonal stressors, the association between NSSI and substance use likely may be explained as the consequence of common underlying factors (i.e., common liability model; Donovan and Jessor, 1985; Vanyukov et al., 2003). For instance, as proposed by theoretical models of adolescent substance use (e.g., Khantzian, 1990; Boys et al., 1999; Wills et al., 2006), substance use, similar to NSSI, may serve multiple functions, internal (e.g., reduce negative emotional states) as well as social (e.g., avoid social rejection). Consequently the two behaviors may be expected to co-occur as they may represent different strategies to deal with similar situations. This hypothesis has found support in prior work among community-based adolescents in which self-injury has been shown to co-occur with other health risk behaviors, including substance use (e.g., Hilt et al., 2008b; Madge et al., 2008; Portzky et al., 2008). Although

no previous studies compared the association between NSSI and substance use across different countries, cross-cultural evidence exists with regard to DSH, indicating country differences in the association between DSH and substance use (e.g., cannabis use; Rossow et al., 2009). Here, similar cross-national associations between NSSI and substance use may suggest that NSSI is another adolescent risk behavior and likely in each country serves similar functions as substance use does.

1.1. The present study

This study aimed to extend previous NSSI literature by exploring the rates and correlates of NSSI, including internal distress (depressive symptoms, family-related and peer-related loneliness) interpersonal stressors (peer victimization, low peer preference), and substance use (i.e., cigarette smoking, frequent binge drinking and marijuana use), across three samples from different nations (i.e., Italy, the Netherlands, and the United States). Based on existing theories suggesting that internal distress and interpersonal stressors may lead to NSSI (functional models, Nock and Prinstein, 2005) whereas substance use may co-occur with NSSI (common liability models, Donovan and Jessor, 1985), the associations between NSSI and these two groups of factors were examined in two separate models. To our knowledge, only one study to date investigated DSH among a community sample of Italian adolescents, reporting a lifetime rate of 46% (Cerutti et al., 2011), and two studies found evidence of DSH among non-clinical adolescents in the Netherlands, with a last year prevalence of 2.6% (Madge et al., 2008; Portzky et al., 2008). It is worth noting that although these countries are considered Western societies, differences exist between them with respect to socio-cultural norms, traditions, as well as substance use policies (Ciairano et al., 2009; Simons-Morton et al., 2010). Such differences may be reflected in adolescent interpersonal relationships as well as in their involvement in problem behaviors. For instance, prior work showed higher levels of substance use (i.e., alcohol use and cigarette smoking) among Italian and Dutch adolescents compared to U.S. adolescents (Hibell et al., 2009; Simons-Morton et al., 2010). The purpose of this study was to explore whether correlates of NSSI would be similar across different cultures, suggesting similar models of risk that may apply more universally than what has been tested previously.

2. Methods

2.1. Procedure and participants

In all three countries, participants were recruited in secondary public schools. In accordance with the local policy of each country, an active consent procedure was adopted in Italy and United States and a passive one in the Netherlands. This study was approved by the respective university ethics committees for research involving human subjects.

In Italy, 1038 families of adolescents attending three schools located in the suburban area of the Northwest of Italy were asked to participate in the study. Of these, 48 (4.6%) denied permission. Moreover, 163 adolescents were excluded from the analyses due to the absence on the day of the assessment ($n = 137$), presence of a disorder (e.g., autism; $n = 15$), unreliable data due to nonsense answers ($n = 6$), or because they were older than 19 years of age ($n = 5$). Thus, the final sample included 827 Italian adolescents (79.7% of the targeted population). In the Netherlands, data were collected in four schools located in suburban environments of the southwest. We obtained passive consent for all the 756 contacted families. Overall, 81 adolescents were not included in the analyses because they were absent on the day of the test ($n = 65$), they had missing data on the NSSI measure ($n = 6$), they refused to fill out the questionnaire ($n = 2$), or they clearly provided nonsense answers ($n = 8$). This yielded to a final sample 675 Dutch adolescents (89.3% of the targeted population). In the United States, consent forms were distributed to all ninth graders in three high schools in a rural area of the Southeast U.S. ($n = 712$). Overall, 533 consent forms were returned; 426 (59.8%) granted consent to participate. Data from 66 participants were unavailable due to absenteeism ($n = 50$) or missing data ($n = 16$). Thus, participants in the study included 360 students (50.6% of the targeted population).

The final combined sample included 1862 adolescents (51% male), mainly Caucasians (85.2%), aged between 14 and 19 years old ($M = 15.69$, $S.D. = 0.87$). Comparison of the three samples revealed significant differences in a number of socio-demographic characteristics (see Table 1).

Table 1
Sample characteristics by country.

	Italy (n = 827)	The Netherlands (n = 675)	United States (n = 360)	p-value ^a
Gender,% male	55.5	48.4	44.7	0.001
Age (S.D.)	15.60 (1.08)	15.83 (0.67)	15.66 (0.56)	<0.001
Ethnicity ^b ,%	95.3	93.3	47.2	<0.001
Caucasian				
Parental education,%				<0.001
Low ^c	20.3	20.8	14.2	
Medium ^d	58.7	27.5	40.9	
High ^e	21	51.7	44.9	

^a Chi-square tests and ANOVA were used to test country differences.

^b Other non-Caucasian ethnic groups were: in the Italian sample 2.3% Morocco, 1.5% Latino, 0.4% Chinese, 0.5% others; in the Dutch sample 0.9% Suriname, Turkish 0.6%, 0.3% Morocco, 4.9% others; in the American sample 24.2% African American, 20% Latino, 0.8% Asian, 7.8% others.

^c Low = less than high school.

^d Medium = high school.

^e High = post high school or college graduate.

2.2. Measures

The same data collection procedure was adopted across the three countries. Trained researchers administered questionnaires during class time. Participants' anonymities were guaranteed. For some of the measures employed (i.e., NSSI, Short Mood and Feeling Questionnaire (SMFQ) and Social and Emotional Loneliness Scale for Adults—Short Form (SELSA-S)), the Italian and/or Dutch versions were not available; thus, a forward–backward translation was used to obtain the measures in these languages. Table 2 presents descriptive statistics for psychosocial factors and substance use variables by countries.

2.2.1. Non-suicidal self-injury (NSSI)

NSSI was assessed through a 6-item measure (Prinstein et al., 2008). Adolescents were asked to report on a 5-point scale (0 = never, 4 = 10 or more times) as to how frequently they intentionally engaged in several types of self-injurious behaviors (i.e., cut/carved skin, burned skin, hit self, bit self, scrap skin to draw blood, insert objects under skin or nails) without suicidal intent. The reference period was 6 months for the United States and 1 year for Italy and the Netherlands. This measure has been previously administered to adolescent samples and has shown good reliability and convergent validity, correlating highly with a widely used single-item measure of NSSI (i.e., 'How often have you intentionally harmed or hurt your body – for example by cutting or burning your skin – without intending to die?'; Prinstein et al., 2008, 2010). In our sample, internal consistency was acceptable, with Cronbach's alphas ranging from 0.66 (for the United States) to 0.76 (for the Netherlands). In line with prior research, to assess the overall prevalence of NSSI within the last year, a dichotomous variable was created to distinguish between adolescents who engaged in any of the NSSI behaviors at least once and adolescent who did not report any NSSI experience (e.g., Ross and Heath, 2002; Cerutti et al., 2011).

2.2.2. Depressive symptoms

Participants completed the SMFQ (Angold et al., 1995), which consists of 13 items (e.g., 'I felt miserable or unhappy') describing depressive symptoms during the past 2 weeks. Each item was rated on a 3-point scale (0 = not true, 2 = true), and a mean score was computed across all items, with higher values indicating higher level of depressive symptoms. The SMFQ has been shown to have good construct and concurrent validity (Angold et al., 1995; Sharp et al., 2006) and it has been widely used in previous

Table 2
Descriptive statistics for psychosocial factors and substance use variables by country.

	Italy (n = 827)	The Netherlands (n = 675)	United States (n = 360)	p-value ^a
Psychosocial risk factors				
Depressive symptoms (S.D.)	0.51 (0.38)	0.31 (0.32)	0.36 (0.40)	<0.001
Family loneliness (S.D.)	1.78 (0.76)	1.77 (0.70)	1.71 (0.90)	0.280
Peer loneliness (S.D.)	1.80 (0.69)	1.67 (0.60)	1.76 (0.68)	0.001
Peer preference (S.D.)	0.15 (1.56)	0.08 (1.50)	0.20 (1.48)	0.440
Peer victimization,%	22.5	19.7	19.2	0.283
Substance use,%				
Daily smokers	34.9	22.9	8.1	<0.001
Frequent binge drinking	17.5	41.7	3.3	<0.001
Frequent marijuana use	8.0	10.8	6.4	0.040

^a Chi-square tests and ANOVAs were used to test country differences.

studies to assess depressive symptoms in adolescent populations (e.g., Stansfeld et al., 2004; Rothson et al., 2009). In our sample, internal consistency was good, with Cronbach's alphas ranging from 0.84 (for Italy) to 0.89 (for the United States).

2.2.3. Loneliness

Two subscales adapted from the SELSA-S (DiTommaso et al., 2004) were used to assess family and peer-related loneliness, respectively. Each subscale consists of 5 items (e.g., 'I feel alone when I am with my family') rated on a 5-point scale (1 = strongly disagree, 5 = strongly agree). Negative items were reversed, and a mean score across the items was calculated within each subscale, with higher values indicating higher levels of loneliness. The two subscales have previously demonstrated good construct and concurrent validity (DiTommaso et al., 2004) and have been used with adolescent samples (Goossens et al., 2009). In our sample, internal consistency was acceptable for both subscales, with Cronbach's alphas ranging from 0.66 (for the United States) to 0.74 (for Italy) for family loneliness, and from 0.67 (for the United States) to 0.84 (for the Netherlands) for peer-related loneliness.

2.2.4. Peer victimization

Three items from the revised version of the Olweus Bully/Victim Questionnaire (Olweus, 1996) were used to assess peer victimization. In line with previous studies (e.g., Giletta et al., 2010), participants were provided with a clear definition of victimization: 'We can say a student is being victim of bullying when another student or a group of peers says malicious or hurtful things to him. The same is true when a student is being hit, kicked, threatened, or is being excluded from the group. We call it "bullying" when these things happen frequently or regularly, and when it's difficult for the student being bullied to defend him or herself. It is NOT bullying when two or more students who are equally strong tease each other or fight with each other' (Olweus, 1996). Thus, they were asked to report on a 5-point scale (0 = never, 4 = several times a week) how often they had been victimized in the past 2 months at school (e.g., 'How often were you beaten, kicked, or hit by other peers?'). This measure has previously demonstrated good psychometric properties (Solberg and Olweus, 2003). In line with the bullying literature, adolescents who reported to be victimized at least two or three times a month in at least one item were defined as being victimized (Solberg and Olweus, 2003). Yet, as adolescents who reported to be victimized once or twice in two or more items, similarly experienced repeated victimization, they were also classified as victimized. The resulting dichotomized variable, distinguishing between adolescents with victimization experience to those without, was used for the analyses.

2.2.5. Peer preference

The same peer nomination procedure for measuring peer preference was employed in all three countries. Adolescents were asked to complete two sociometric questions by nominating an unlimited number of peers they "liked the most" and "liked the least" from a roster of all grademates. To ensure anonymity, in Italy and the Netherlands a number was assigned to each participants' name presented on the roster and adolescents were instructed to report on the questionnaire the numbers, instead of the names, associated with the grademates they wanted to nominate. In the United States, participants were asked to circle the code numbers next to names of their grademates presented on the roster; subsequently, only the code numbers were entered into the data to guarantee anonymity. A peer preference score was calculated for each participant by subtracting the nominations received on the like-least criterion from the nominations received on the like-most criterion (Coie and Dodge, 1983). Subsequently, these final scores were standardized within the grade to account for differences in grade size. Higher scores indicated higher levels of peer preference.

2.2.6. Substance use

Three items adapted from the Youth Risk Behavior Survey (YRBS) (Brener et al., 1995) were used to measure adolescent substance use in the past 6 months. One item assessed the number of daily smoked cigarettes on a 6-point scale (0 = none, 5 = more than a package). The other two items measured the frequency of binge drinking (i.e., having five or more alcoholic drinks in a row within a few hours) and marijuana use on a 5-point scale (0 = never, 4 = 20 or more times). Due to the highly skewed distributions of the substance use measures, a dichotomous variable was created for each of them. Daily smoking was defined as smoking at least one cigarette per day, and frequent binge drinking and marijuana use were defined as having three or more episodes in the past 6 months.

2.2.7. Socio-demographic variables

Self-reported information on socio-demographic characteristics included age, gender, ethnicity, and parents' educational level. Due to differences in the ethnic composition and educational system of the three populations (i.e., Italian, Dutch and U.S.), specific codes were used for each country to collect information on ethnicity and parents' educational level. Subsequently, for comparison purposes, different ethnical categories were combined to form a dichotomous variable that distinguished between Caucasian and non-Caucasian participants. Moreover, three categories were created to reflect parents' educational level, corresponding to low (i.e., less than high school), medium (i.e.; high school), and high (i.e., post high school or college graduate) educational level. The highest educational level of the parents (or the one available in case of missing information) was used as a proxy for socioeconomic status (SES).

2.3. Statistical analysis

Descriptive statistics were performed to examine and compare prevalence of NSSI across the three samples. Next, multivariate logistic regression analyses were performed in Mplus 5.0 (Muthén and Muthén, 2006) with NSSI (no NSSI incident vs. NSSI incident) as a dichotomous outcome variable. In the first model, the predictors included internal (i.e., depressive symptoms and loneliness) and interpersonal (i.e., peer victimization and peer-reported peer preference) factors. The second model included substance use variables (i.e., smoking, frequent binge drinking and marijuana use) as predictors. In each model, Odds ratios (ORs) were adjusted for socio-demographic covariates. Finally, the same models were conducted separately by country and a multi-group approach was used to test sample differences. This approach allows comparing models across different sub-groups of participants within the total sample (e.g., adolescents in each country) in order to test whether similar effects are estimated across groups. Specifically, first, an overall test of difference examined whether each model differed across countries by comparing a free model with a model in which all the parameters were constrained to be equal each time across two of the three samples. Second, when differences in the overall test were found, individual parameters were examined one-by-one. Chi-square difference tests were employed to compare nested models using log likelihoods.

3. Results

3.1. Prevalence of NSSI in the three samples

Overall, approximately 24% of the adolescents (23.6% Italy; 25.8% the Netherlands; 21.9% United States) reported at least one NSSI experience during the previous months. The first chi-square test indicated no significant differences across the three samples in the percentages of adolescents involved in NSSI. However, due to several sample differences with respect to participants' socio-demographic characteristics (see Table 1), additional chi-square tests, each controlling for one socio-demographic (e.g., gender), were conducted to compare NSSI prevalence across samples. None of the tests were significant, suggesting that similarity in NSSI prevalence across three samples was not affected by differences in participants' socio-demographic characteristics.

In all samples, NSSI rates varied by gender, with females being more involved in NSSI compared to males ($\chi^2 = 8.06$, d.f. = 1, $p = 0.004$; $\chi^2 = 23.10$, d.f. = 1, $p < 0.001$; $\chi^2 = 8.42$, d.f. = 1, $p = 0.004$; for Italy, the Netherlands, and the United States, respectively). No differences in NSSI prevalence rates were found regarding age, ethnicity, and parent educational level in any of the samples.

3.2. Multivariate logistic regressions

3.2.1. Psychosocial factors

In the total sample, higher levels of depressive symptoms and family-related loneliness were associated with higher probabilities of reporting NSSI experiences. Moreover, compared to non-victimized adolescents, victimized adolescents also were more likely to engage in NSSI. No significant differences in the odds ratios of reporting NSSI incidents were found for adolescents with different levels of peer-related loneliness and peer preference. Whereas depressive symptoms were significantly and strongly associated with the probability of reporting NSSI across samples, family-related loneliness was significantly associated with NSSI exclusively among Dutch and U.S. adolescents but not Italian while peer victimization was significantly associated with NSSI only among Italian and Dutch adolescents but not U.S. adolescents (Table 3). However, in spite of these differences in the significance levels, multi-group analyses comparing the overall model across countries (e.g., Italy vs. United States) did not show any evidence for sample differences, indicating that the predictors in the model explained a similar amount of variance in each sample.¹

¹ To be conservative, even if the overall test did not show any difference across samples, additional follow-up comparisons were conducted for each of the significant predictors: depressive symptoms, family-related loneliness and peer victimization. None of the tests emerged to be statistically significant, indicating no sample differences in the magnitude of any of the predictors.

3.2.2. Substance use

In the total sample, daily smokers and frequent marijuana users were more likely to report NSSI incidents compared to non-daily smokers and non-marijuana users. However, frequent binge drinking was not associated with higher odds of reporting NSSI. Table 4 presents ORs (adjusted for socio-demographic covariates) separately by country. Among Italian adolescents, none of the substance use variables was significantly associated with NSSI. On the contrary, frequent marijuana use related to NSSI among Dutch and U.S. adolescents while cigarette smoking related to NSSI exclusively among U.S. adolescents.

Multi-group analyses for the overall models indicated sample differences between United States and both Italy ($\Delta\chi^2 = 13.14$, d.f. 3, $p = 0.004$) and the Netherlands ($\Delta\chi^2 = 9.19$, d.f. 3, $p = 0.027$), suggesting that substance use was more strongly related to NSSI in the United States compared to Italy and the Netherlands (see Nagelkerke pseudo R^2 Table 4). However, follow-up comparisons of the single predictors showed significant differences only for cigarette smoking between the Netherlands and United States, indicating that the magnitude of the effect was greater among U.S. adolescents ($\Delta\chi^2 = 4.46$, d.f. 1, $p = 0.035$).

3.2.3. Additional analyses

To examine whether adolescents who endorsed NSSI on multiple occasions differed from those who did only once or twice, two additional multinomial logistic regressions were performed in the total sample with a three-category variable of NSSI (no NSSI, once or twice, three times or more) as outcome. Results revealed differences only on depressive symptoms (OR = 1.81, $p = 0.022$, 95% CI [1.09, 3.00]), indicating that adolescents engaging multiple times in NSSI were more likely to report higher depressive symptoms than adolescents engaging only once or twice. Moreover, when comparing adolescents with no NSSI experiences to those with multiple experiences, patterns identical to those using a dichotomized outcome were found. That is, significant differences were revealed on depressive symptoms, family loneliness and victimization in one model, and cigarette smoking and frequent marijuana use in the other.

4. Discussion

This study examined non-suicidal self-injury behaviors among adolescents from Italy, the Netherlands, and the United States using the same methodology. We examined the prevalence of NSSI across samples from these three countries and extended previous literature by examining the associations between NSSI and both psychosocial factors and substance use cross-nationally. Overall, we found large sample similarities and revealed cross-national differences in the relation between NSSI and substance use.

Our findings indicated that the prevalence of NSSI was similar across samples, with approximately 24% of adolescents reporting at least one NSSI experience within the previous year. This percentage is in line with findings reported in prior studies on non-clinical adolescents (Heath et al., 2008). However, previous NSSI research has been conducted mainly among North American adolescents, and less is known about NSSI in other countries, including Europe where existing studies have largely focused on DSH (e.g., Hawton et al., 2002; Lundh et al., 2007). Our study adds to the literature by demonstrating that NSSI in Italian and Dutch samples is as prevalent as in a U.S. sample. These findings corroborate those from the only existing work comparing NSSI across samples from different countries (Plener et al., 2009). However, they are in contrast with two other studies showing remarkable differences in DSH prevalence rates across countries (Madge et al., 2008; Portzky et al., 2008). A possible explanation for these contrasting results may be that differences in DSH reflect country differences in rates of suicidal behaviors highlighting the importance for future research to distinctly examine suicidal and non-suicidal behaviors (Nock et al., 2008). Although we adopted highly

Table 3
Multivariate logistic regression analyses of relationship between NSSI and psychosocial factors, controlling for sociodemographic covariates (total sample and by country).

	Total sample	Italy	The Netherlands	United States
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Depressive symptoms	4.58 (3.30–6.35)***	5.42 (3.30–8.90)***	7.31 (3.80–14.08)***	4.58 (2.02–10.39)***
Family loneliness	1.36 (1.16–1.59)***	1.18 (0.93–1.49)	1.36 (1.03–1.80)*	1.70 (1.18–2.43)**
Peer loneliness	0.95 (0.80–1.14)	0.97 (0.75–1.25)	0.75 (0.53–1.05)	1.49 (0.95–2.32)
Peer preference	1.04 (0.97–1.13)	1.02 (0.91–1.14)	1.11 (0.98–1.27)	1.08 (0.90–1.31)
Peer victimization	1.96 (1.50–2.57)***	1.61 (1.08–2.41)*	2.80 (1.74–4.50)***	1.33 (0.67–2.64)

ORs were simultaneously adjusted for gender, age, ethnicity (Caucasian vs. not-Caucasian) and parent educational level. Nagelkerke pseudo R^2 : for Italy, $R^2 = 0.15$ ($p < 0.001$); for the Netherlands, $R^2 = 0.24$ ($p < 0.001$); for USA, $R^2 = 0.29$ ($p < 0.001$); for total sample, $R^2 = 0.18$ ($p < 0.001$).

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

similar instruments across countries and we analyzed comparable samples in terms of age and gender, it should be noted that we used convenience samples that may not be representative of the national populations. Therefore, we cannot draw any conclusions about the prevalence rates in representative nation-wide samples in the three countries. Future epidemiological research needs to include nationally representative samples in order to provide a clear picture of NSSI prevalence among non-clinical adolescents.

Concerning psychosocial factors, our findings support the existing theoretical models (Nock and Prinstein, 2005; Messer and Fremouw, 2008) according to which both internal and interpersonal factors relate to NSSI. Specifically, with regard to internal distress, adolescents reporting higher levels of depressive symptoms and family-related loneliness were found to be more likely to engage in NSSI. Moreover, even after controlling for the effects of internal distress, victimized adolescents emerged to endorse NSSI more than non-victimized adolescents. It is important to note that, although the effects of family loneliness in Italy and peer victimization in the United States did not reach the significance level, the magnitude of these effects did not differ across countries. These findings support our hypothesis about great similarity of psychosocial factors associated with NSSI across samples from different cultures.

In line with previous studies (e.g., Hilt et al., 2008b), our results showed that in the United States, daily smokers and frequent marijuana users were more likely to report NSSI incidents compared to adolescents who did not use these substances. These associations may be interpreted in the light of a common liability model according to which NSSI and substance use may be the expression of a third shared underlying factor (Donovan and Jessor, 1985; Vanyukov et al., 2003). Hence, both behaviors may serve similar functions in adolescents' lives, such as curbing negative emotional states (i.e., automatic function) or gaining attention among peers (i.e., social functions) (Boys et al., 1999; Chapman et al., 2006; Wills et al., 2006). Future research is needed to test this hypothesis by identifying potential underlying factors, such as emotional self-control.

However, contrary to our expectations, the co-occurrence of adolescent NSSI and substance use seemed to be particularly pertinent to U.S. adolescents. Indeed, none of the substance use variables were related

to NSSI in Italy, and only marijuana use was related to NSSI in the Netherlands. These findings are in line with a recent study in which, using data from the CASE study (Madge et al., 2008), a stronger association between cannabis use and DSH was found in Norway, where prevalence rates of cannabis use were remarkably lower than in England (Rossow et al., 2009). Such difference provides indications about the nature of the relation between cannabis use and DSH, suggesting shared common factors underlying the two behaviors (e.g., family-related factors) rather than causality (i.e., cannabis use predicting DSH). Indeed, as the authors stated, a causal relation could be assumed if cannabis use was more strongly associated with DSH among those adolescents more highly exposed to cannabis use (i.e., in England). Similarly, our findings show a stronger association between substance use and NSSI in the United States, where substance use was less prevalent than in Italy and the Netherlands, which provides further support for a common liability between these behaviors.

The complex interplay between substance use policies, social norms, and prevalence rates in the three populations might help to interpret these country differences (these results) further. Compared to the United States, substance use policies in European countries are more tolerant, cigarettes and alcohol are available from an earlier age (e.g., purchase age for both cigarette and alcohol is 16 years old in Italy and the Netherlands vs. 18 and 21 years old respectively in the United States) and prevalence rates tend to be higher (at least for cigarette smoking and alcohol use) due to their normativity (Hibell et al., 2009; Simons-Morton et al., 2010). Also, in the Netherlands, marijuana can be legally purchased after the age of 18. Thus, in European countries, adolescent substance use tends to be socially more accepted and somewhat normative during this developmental period as compared to the United States. Conversely, NSSI is an extreme health risk behavior and by definition socially unaccepted. Hence, in European countries, the two behaviors may serve different functions; for instance it has been shown that substance use primarily serves social functions during adolescence (e.g., Engels et al., 2006; Ciairano et al., 2008), whereas NSSI may possibly serve mainly internal functions. Future studies are strongly needed to directly examine the functional models of NSSI in countries outside North America. On the other hand, in the United States, substance use is an extreme and legally

Table 4
Multivariate logistic regression analyses of relationship between NSSI and substance use, controlling for sociodemographic covariates (total sample and by country).

	Total sample	Italy	The Netherlands	United States
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Smoking	1.42 (1.09–1.85)**	1.40 (0.97–2.02)	1.19 (0.76–1.87)	3.54 (1.45–8.61)**
Binge drinking	1.07 (0.81–1.42)	1.03 (0.63–1.69)	0.99 (0.66–1.49)	1.94 (0.45–8.39)
Marijuana use	1.69 (1.13–2.53)*	1.02 (0.51–2.04)	2.04 (1.10–3.76)*	3.13 (1.07–9.17)*

ORs were simultaneously adjusted for gender, age, ethnicity (Caucasian vs. not-Caucasian) and parent educational level.

Nagelkerke pseudo R^2 : for Italy, $R^2 = 0.03$ ($p < 0.05$); for the Netherlands, $R^2 = 0.08$ ($p < 0.01$); for USA, $R^2 = 0.14$ ($p < 0.01$); for total sample, $R^2 = 0.05$ ($p < 0.001$).

* $p < 0.05$.

** $p < 0.01$.

sanctioned behavior during adolescence, and this might explain the stronger association with NSSI. That is, both behaviors may equally serve automatic as well social functions.

This study is the first to investigate several correlates of NSSI (i.e., psychosocial factors and substance use) in three samples of non-clinical adolescents from different countries. However, our findings need to be interpreted in the light of some limitations. First, the cross-sectional nature of the data does not allow drawing any temporal conclusion. For instance, even though, based on previous theoretical models (Messer and Fremouw, 2008), we assume that psychosocial factors precede adolescents' NSSI, independent co-variables may explain their co-occurrence. Longitudinal research is needed to clearly distinguish between determinants and concurrent factors of NSSI. Second, our findings rely mainly on questionnaire data. Ecological momentary assessment (EMA) methods may represent a more valid alternative for reducing recall biases (Nock et al., 2010). Third, due to different assessment strategies allowed within each country (passive vs. active consent) remarkably different participation rates were obtained across countries, especially between the United States and the Netherlands. Thus, it cannot be excluded that the lower participation rate in the United States resulted in a somewhat selective sample in which NSSI prevalence was actually lower than the one among the targeted participants (Courser et al., 2009). Finally, as mentioned earlier, the use of convenience samples did not allow us to extend our results to general populations in the three countries.

In conclusion, our findings underline the importance of investigating NSSI in adolescents residing outside the United States. Moreover, country similarities in psychosocial factors associated with NSSI indicate that, even in different cultural contexts, adolescents experiencing higher levels of internal distress and interpersonal stress may be at much higher risk for engaging in NSSI.

References

- Angold, A., Costello, E.J., Messer, S.C., Pickles, A., 1995. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. *International Journal of Methods in Psychiatric Research* 5, 237–249.
- Avenevoli, S., Knight, E., Kessler, R.C., Merikangas, K.R., 2008. The epidemiology of depression in children and adolescents. In: Abela, J.R.Z., Hankin, B.L. (Eds.), *Handbook of Child and Adolescent Depression*. The Guilford Press, New York, pp. 6–34.
- Baetens, I., Claes, L., Muehlenkamp, J., Grietens, H., Onghena, P., 2011. Non-suicidal and suicidal self-injurious behavior among Flemish adolescents: a web-survey. *Archives of Suicide Research* 15, 56–67.
- Bjärehed, J., Lundh, L.-G., 2008. Deliberate self-harm in 14-year-old adolescents: how frequent is it, and how is it associated with psychopathology, relationship variables, and styles of emotional regulation? *Cognitive Behaviour Therapy* 37, 26–37.
- Boys, A., Marsden, J., Griffiths, P., Fountain, J., Stillwell, G., Strang, J., 1999. Substance use among young people: the relationship between perceived functions and intentions. *Addiction* 94, 1043–1050.
- Brener, N.D., Collins, J.L., Kann, L., Warren, C.W., Williams, B.I., 1995. Reliability of the youth risk behavior survey questionnaire. *American Journal of Epidemiology* 141, 575–580.
- Bureau, J.F., Martin, J., Freynet, N., Poirier, A.A., Lafontaine, M.-F., Cloutier, P., 2010. Perceived dimensions of parenting and nonsuicidal self-injury in young adults. *Journal of Youth and Adolescence* 39, 484–494.
- Cerutti, R., Manca, M., Presaghi, F., Gratz, K.L., 2011. Prevalence and clinical correlates of deliberate self-harm among a community sample of Italian adolescents. *Journal of Adolescence* 34, 337–347.
- Chapman, A.L., Gratz, K.L., Brown, M.Z., 2006. Solving the puzzle of deliberate self-harm: the experiential avoidance model. *Behavior Research and Therapy* 44, 371–394.
- Ciairano, S., Bosma, H., Miceli, R., Settanni, M., 2008. Adolescent substance use in two European countries: relationships with psychosocial adjustment, peers, and activities. *International Journal of Clinical and Health Psychology* 8, 119–138.
- Ciairano, S., Kliewer, W., Rabaglietti, E., 2009. Adolescent risk behavior in Italy and the Netherlands. *European Psychologist* 14, 180–192.
- Coie, J.D., Dodge, K.A., 1983. Continuities and changes in children's social status: a five-year longitudinal study. *Merrill-Palmer Quarterly* 29, 261–282.
- Courser, M.W., Shamblen, S.R., Lavrakas, P.J., Collins, D., Ditterline, P., 2009. The impact of active consent procedures on nonresponse and nonresponse error in youth survey data: evidence from a new experiment. *Evaluation Review* 33, 370–395.
- De Leo, D., Heller, T.S., 2004. Who are the kids who self-harm? An Australian self-report school survey. *Medical Journal of Australia* 181, 140–144.
- DiTommaso, E., Brannen, C., Best, L., 2004. Measurement and validity characteristics of the short version of the social and emotional loneliness scale for adults. *Educational and Psychological Measurement* 64, 99–119.
- Donovan, J.E., Jessor, R., 1985. Structure in problem behaviors in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology* 53, 890–904.
- Engels, R.C.M.E., Scholte, R.H.J., van Lieshout, C.F.M., de Kemp, R., Overbeek, G., 2006. Peer group reputation and smoking and alcohol consumption in early adolescence. *Addictive Behaviors* 31, 440–449.
- Giletta, M., Scholte, R.H.J., Engels, R.C.M.E., Larsen, J.K., 2010. Body mass index and victimization during adolescence: the mediation role of depressive symptoms and self-esteem. *Psychosomatic Research* 69, 541–547.
- Goossens, L., Lasgaard, M., Luyckx, K., Vanhalst, J., Mathias, S., Masy, E., 2009. Loneliness and solitude in adolescence: a confirmatory factor analysis of alternative models. *Personality and Individual Differences* 47, 890–894.
- Hankin, B.L., Abela, J.R.Z., 2011. Nonsuicidal self-injury in adolescence: prospective rates and risk factors in a 2 ½ year longitudinal study. *Psychiatry Research* 186, 65–70.
- Hawton, K., Rodham, K., Evans, E., Weatherall, R., 2002. Deliberate self harm in adolescents: self report survey in schools in England. *British Medical Journal* 325, 1207–1211.
- Hay, C., Meldrum, R., 2010. Bullying victimization and adolescent self-harm: testing hypotheses from general strain theory. *Journal of Youth and Adolescence* 39, 446–459.
- Heath, N.L., Schaub, K., Holly, S., Nixon, M.K., 2008. Self-Injury today: review of population and clinical studies in adolescents. In: Nixon, M.K., Heath, N.L. (Eds.), *Self-Injury in Youth: the Essential Guide to Assessment and Intervention*. Routledge Press, New York, pp. 9–27.
- Heinrich, L.M., Gullone, E., 2006. The clinical significance of loneliness: a literature review. *Clinical Psychology Review* 26, 695–718.
- Hibell, B., Guttormsson, U., Ahlström, S., Balakireva, O., Bjarnason, T., Kokkevi, A., Kraus, L., 2009. *The 2007 ESPAD report - Substance use among students in 35 European countries*. Stockholm: Sweden: The Swedish Council for Information on Alcohol and Other Drugs (CAN).
- Hilt, L.M., Cha, C.B., Nolen-Hoeksema, S., 2008a. Nonsuicidal self-injury in young adolescent girls: moderators of the distress-function relationship. *Journal of Consulting and Clinical Psychology* 76, 63–71.
- Hilt, L.M., Nock, M.K., Lloyd-Richardson, E.E., Prinstein, M.J., 2008b. Longitudinal study of nonsuicidal self-injury among young adolescents: rates, correlates, and preliminary test of an interpersonal model. *Journal of Early Adolescence* 28, 455–469.
- Jutengren, G., Kerr, M., Stattin, H., 2011. Adolescents' deliberate self-harm, interpersonal stress, and the moderation effects of self-regulation: a two-wave longitudinal analysis. *Journal of School Psychology* 49, 249–264.
- Khantzian, E.J., 1990. Self-regulation and self-medication factors in alcoholism and the addiction. In: Galanter, M. (Ed.), *Recent Developments in Alcoholism*. Plenum Press, New York, pp. 255–271.
- Klonsky, E.D., 2007. The functions of deliberate self-injury: a review of the evidence. *Clinical Psychology Review* 27, 226–239.
- Laird, R.D., Jordan, K.Y., Dodge, K.A., Pettit, G.S., Bates, J.E., 2001. Peer rejection in childhood, involvement with antisocial peers in early adolescence, and the development of externalizing behavior problems. *Developmental Psychopathology* 13, 337–354.
- Lasgaard, M., Goossens, L., Bramsen, R.H., Trillingsgaard, T., Elklit, A., 2011. Different sources of loneliness are associated with different forms of psychopathology in adolescence. *Journal of Research in Personality* 45, 233–237.
- Laye-Gindhu, A., Schonert-Reichl, K.A., 2005. Nonsuicidal self-harm among community adolescents: understanding the "whats" and "whys" of self-harm. *Journal of Youth and Adolescence* 34, 447–457.
- Lloyd-Richardson, E.E., Perrine, N., Dierker, L., Kelley, M.L., 2007. Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological Medicine* 37, 1183–1192.
- Lopez, C., DuBois, D.L., 2005. Peer victimization and rejection: investigation of an integrative model of effects on emotional, behavioral, and academic adjustment in early adolescence. *Journal of Clinical Child and Adolescent Psychology* 34, 25–36.
- Lundh, L.-G., Karim, J., Quilisch, E., 2007. Deliberate self-harm in 15-year-old adolescents: a pilot study with a modified version of the Deliberate Self-Harm Inventory. *Scandinavian Journal of Psychology* 48, 33–41.
- Madge, N., Hewitt, A., Hawton, K., de Wilde, E.J., Corcoran, P., Fekete, S., van Heeringen, K., De Leo, D., Ystgaard, M., 2008. Deliberate self-harm within an international community sample of young people: comparative findings from the Child & Adolescent Self-Harm in Europe (CASE) study. *Journal of Child Psychology and Psychiatry* 49, 667–677.
- Matsumoto, T., Imamura, F., Chiba, Y., Katsumata, Y., Kitani, M., Takeshima, T., 2008. Prevalence of lifetime histories of self-cutting and suicidal ideation in Japanese adolescents: differences by age. *Psychiatry and Clinical Neurosciences* 62, 362–364.
- Messer, J.M., Fremouw, W.J., 2008. A critical review of explanatory models for self-mutilating behaviors in adolescents. *Clinical Psychology Review* 28, 162–178.
- Muthén, L.K., Muthén, B.O., 2006. *Mplus*. Los Angeles, California.
- Nock, M.K., Favazza, A.R., 2009. Nonsuicidal self-injury: definition and classification. In: Nock, M.K. (Ed.), *Understanding Nonsuicidal Self-Injury: Origin, Assessment, and Treatment*. American Psychological Association, Washington, pp. 9–18.
- Nock, M.K., Prinstein, M.J., 2005. Contextual features and behavioral functions of self-mutilation among adolescents. *Journal of Abnormal Psychology* 114, 140–146.
- Nock, M.K., Borges, G., Bromet, E.J., Alonso, J., Angermeyer, M., Beautrais, A., Bruffaerts, R., Chiu, W.T., de Girolamo, G., Gluzman, S., de Graaf, R., Gureje, O., Haro, J.M., Huang, Y., Karam, E., Kessler, R.C., Lepine, J.P., Levinson, D., Medina-Mora, M.E., Ono,

- Y., Posada-Villa, J., Williams, D., 2008. Cross-national prevalence and risk factors for suicidal ideation, plans, and attempts. *The British Journal of Psychiatry* 192, 98–105.
- Nock, M.K., Prinstein, M.J., Sterba, S.K., 2010. Revealing the form and function of self-injurious thoughts and behaviors: a real-time ecological assessment study among adolescents and young adults. *Journal of Abnormal Psychology* 118, 816–827.
- O'Connor, R.C., Rasmussen, S., Miles, J., Hawton, K., 2009. Self-harm in adolescents: self-report survey in schools in Scotland. *The British Journal of Psychiatry* 194, 68–72.
- Olweus, D., 1996. *The Revised Olweus Bully/Victim Questionnaire*. University of Bergen, Bergen.
- Plener, P.L., Libal, G., Keller, F., Fegert, J.M., Muehlenkamp, J.J., 2009. An international comparison of adolescent non-suicidal self-injury (NSSI) and suicide attempts: Germany and the USA. *Psychological Medicine* 39, 1549–1558.
- Portzky, G., De Wilde, E.J., van Heeringen, K., 2008. Deliberate self harm in young people: differences in prevalence and risk factors between the Netherlands and Belgium. *European Child & Adolescent Psychiatry* 17, 179–186.
- Prinstein, M.J., Nock, M.K., Simon, V., Aikins, J.W., Cheah, C., Spirito, A., 2008. Longitudinal trajectories and predictors of adolescent suicidal ideation and attempts following inpatient hospitalization. *Journal of Consulting and Clinical Psychology* 76, 92–103.
- Prinstein, M.J., Heilbron, N., Guerry, J.D., Franklin, J.C., Rancourt, D., Simon, V., Spirito, A., 2010. Peer influence and nonsuicidal self-injury: longitudinal results in community and clinically-referred adolescent samples. *Journal of Abnormal Child Psychology* 38, 669–682.
- Rodham, K., Hawton, K., 2009. Epidemiology and phenomenology of nonsuicidal self-injury. In: Nock, M.K. (Ed.), *Understanding Nonsuicidal Self-Injury: Origin, Assessment, and Treatment*. American Psychological Association, Washington, DC, pp. 37–62.
- Ross, S., Heath, N.L., 2002. A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of Youth and Adolescence* 31, 67–77.
- Rossow, I., Hawton, K., Ystgaard, M., 2009. Cannabis use and deliberate self-harm in adolescence: a comparative analysis of associations in England and Norway. *Archives of Suicide Research* 13, 340–348.
- Rothon, C., Head, J., Clark, C., Klineberg, E., Cattell, V., Stansfeld, S., 2009. The impact of psychological distress on the educational achievement of adolescents at the end of compulsory education. *Social Psychiatry and Psychiatric Epidemiology* 44, 421–427.
- Sharp, C., Goodyer, I.M., Croudace, T.J., 2006. The short mood and feelings questionnaire (SMFQ): a unidimensional item response theory and categorical data factor analysis of self-report ratings from a community sample of 7-through 11-year-old children. *Journal of Abnormal Child Psychology* 34, 379–391.
- Simons-Morton, B., Pickett, W., Boyce, W., ter Bogt, T.M.F., Vollebergh, W., 2010. Cross-national comparison of adolescent drinking and cannabis use in the United States, Canada, and the Netherlands. *The International Journal on Drug Policy* 21, 64–69.
- Solberg, M.E., Olweus, D., 2003. Prevalence estimation of school bullying with the Olweus Bully/Victim Questionnaire. *Aggressive Behavior* 29, 239–268.
- Sourander, A., Aromaa, M., Pihlakoski, L., Haavisto, A., Rautava, P., Helenius, H., Sillanpää, M., 2006. Early predictors of deliberate self-harm among adolescents: a prospective follow-up study from age 3 to age 15. *Journal of Affective Disorders* 93, 87–96.
- Stansfeld, S.A., Haines, M.M., Head, J.A., Bhui, K., Viner, R., Taylor, S.J.C., Hillier, S., Klineberg, E., Booy, R., 2004. Ethnicity, social deprivation and psychological distress in adolescents: school-based epidemiological study in east London. *The British Journal of Psychiatry* 185, 233–238.
- Vanyukov, M.M., Tarter, R.E., Kirisci, L., Kirillova, G.P., Maher, B.S., Clark, D.B., 2003. Liability to substance use disorders: common mechanisms and manifestations. *Neuroscience and Biobehavioral Reviews* 27, 507–515.
- Wills, T.A., Walker, C., Mendoza, D., Ainette, M.G., 2006. Behavioral and emotional self-control: relations to substance use in samples of middle and high school students. *Psychology of Addictive Behaviors* 20, 265–278.
- Yates, T.M., Tracy, A.J., Luthar, S.S., 2008. Nonsuicidal self-injury among “privileged” youths: longitudinal and cross-sectional approaches to developmental process. *Journal of Consulting and Clinical Psychology* 76, 52–62.