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Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame☆

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ABSTRACT

Objective: Although child maltreatment is associated with later non-suicidal self-injury (NSSI), the mechanism through which it might lead to NSSI is not well understood. The current retrospective case–control study examined associations between child maltreatment and later NSSI, and investigated the mediating roles of dissociation, alexithymia, and self-blame.

Methods: Participants were 11,423 Australian adults (response rate 38.5%), randomly selected from the Australian Electronic White Pages, aged between 18 and 100 ($M = 52.11$, $SD = 16.89$), 62.2% female. Data were collected via telephone interviewing. Main outcome measures were reported history of child maltreatment (sexual abuse, physical abuse, neglect) and reported 12-month NSSI. Dissociation, alexithymia, and self-blame were examined as potential mediating variables in the relationship between child maltreatment and later NSSI. All analyses were conducted using logistic regression and adjusted for age and psychiatric diagnosis.

Results: Results differed by gender. Compared to no child maltreatment, physical abuse (OR 2.75, 95% CI 1.68–4.51) and neglect (OR 2.56, 95% CI 1.65–3.99) independently increased the odds of NSSI among females. Physical abuse (OR 2.69, 95% CI 1.44–5.03) increased the odds of NSSI among males. Sexual abuse did not independently increase the odds of NSSI for males or females. For females, self-blame had the greatest effect on the child maltreatment–NSSI relationship (OR decreased by 14.6%, $p < .000$), although dissociation and alexithymia also partially mediated the relationship. For males, dissociation had the greatest effect (OR decreased by 12.9%, $p = .003$) with self-blame also having a relatively strong effect.

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Conclusions: The results indicate that child maltreatment, and in particular, physical abuse, is strongly associated with the development of subsequent NSSI and may be partially mediated by dissociation, alexithymia, and self-blame for females and dissociation and self-blame for males. Altering attributional style (through cognitive therapy or emotion focussed therapy) and improving the capacity to regulate emotions (through dialectical behaviour therapy) may contribute to reduction or cessation of NSSI.

Introduction

Non-suicidal self-injury (NSSI) is the deliberate, self-inflicted destruction of body tissue resulting in immediate damage, without suicidal intent and for purposes not culturally sanctioned (Nixon, Cloutier, & Jansson, 2008). Common methods include skin cutting, scratching and self-battery (Nock, 2010). The broader term "deliberate self-harm" encompasses self injury *with or without* suicidal intent, and includes overdoses and ingesting non-ingestible substances (Skegg, 2005). Self-injury without suicidal intent differs from self-harm in lethality, motivations, and patterns, and requires different management and treatment strategies (Messer & Fremouw, 2008). Substantial research has been conducted in an effort to identify risk factors for NSSI with the aim of developing effective prevention and early intervention. A consistently cited risk factor is child maltreatment (for a review, see Lang & Sharma-Patel, 2011).

Further research has investigated hypothesised mediators of the child maltreatment–NSSI relationship, including dissociation (partial or complete disruption of the normal integration of a person's memory, consciousness, identity or perception, commonly following traumatic experiences; Brodsky, Cloitre, & Dulit, 1995; Gratz, Conrad, & Roemer, 2002; Shenk, Noll, & Cassarly, 2010; Yates, Carlson, & Egeland, 2008) and alexithymia (the inability to identify and describe feelings; Paivio & McCulloch, 2004). It is hypothesised that child maltreatment disturbs the normal development of cognitive and affective processing, integration of thinking and feeling, and capacity to understand and express emotional states, giving rise to both dissociation and alexithymia (Yates, 2009). It has further been suggested that child maltreatment disrupts normative progression toward use of language to share emotional experiences, requiring children to process trauma on a nonverbal level (van der Kolk et al., 1996). Inability to identify or name emotions, coupled with feeling overwhelmed might lead to maltreated children expressing affect through their body (van der Kolk et al., 1996). NSSI may develop as a compensatory, non-verbal strategy to disrupt a sense of psychological numbing and/or to avoid and manage intense, seemingly uncontrollable emotions (Yates, 2009).

Mediational properties of dissociation in the context of child maltreatment and NSSI have been demonstrated in three research studies (Low, Jones, MacLeod, Power, & Duggan, 2000; Weierich & Nock, 2008; Yates et al., 2008). Results indicated that while dissociation mediated the child maltreatment–NSSI relationship, this was only true for sexual abuse and not for physical abuse or neglect. One study (Weierich & Nock, 2008) suggested dissociation entirely accounted for the sexual abuse–NSSI relationship, even after controlling for depression and Borderline Personality Disorder. This is consistent with the argument that of all child maltreatment types, sexual abuse is the most likely to elicit dissociative defences and post traumatic symptoms that motivate or enable tension-reducing behaviours such as NSSI (Briere & Gil, 1998), but since comorbidities between different types of maltreatment were not taken into account by Weierich and Nock, mediational pathways for other types of child maltreatment cannot be ruled out.

A fourth study explored the role of dissociation in the child maltreatment–NSSI relationship (Shenk et al., 2010) using a combined child maltreatment variable (combining sexual abuse, physical abuse and neglect). Dissociation mediated the relationship between this variable and NSSI, after controlling for depression and psychological dysregulation (difficulties in modulation of problematic cognitions, affect and behaviours). There was no examination into whether different child maltreatment types exerted differential influences on dissociation and later NSSI.

The role of alexithymia as a mediator in the child maltreatment–NSSI relationship has only been formally tested in one study (Paivio & McCulloch, 2004) despite good evidence for the univariate relationship between alexithymia and NSSI (e.g., Evren & Evren, 2005; Polk & Liss, 2007). In contrast to studies looking at dissociation as a mediator, Paivio and McCulloch found that alexithymia mediated the physical abuse–NSSI relationship, emotional neglect–NSSI relationship and physical neglect–NSSI relationship, but not the sexual abuse–NSSI relationship. While these results may accurately reflect the differential effects of different types of child maltreatment on emotional and cognitive functioning, additional research is required to validate this assumption.

In addition to dissociation and alexithymia, recent research has begun to investigate the mediating role of self-criticism or self-blame. Child maltreatment often engenders self-hatred and shame, promoting a self-blaming or pessimistic attributional style (Messman-Moore & Coates, 2007), possibly due to children internalising parental (or others who inflict maltreatment) negative beliefs about them (Carlson, Furby, Armstrong, & Shlaes, 1997). Self-hatred, shame and a self-blaming or pessimistic attributional style may well increase vulnerability to using self-punishment as a self-management technique, with NSSI as one such technique, such that NSSI becomes a strategy to ease tension and distress resulting from self-blaming/criticising cognitions (Mikolajczak, Petrides, & Hurry, 2009).

No research to date has investigated the association between self-blame and NSSI in the context of child maltreatment. de Leo and Heller's (2004) study of deliberate self-harm among high school students included both child maltreatment

and "coping by blaming self" in a multiple regression, which showed self-blame was uniquely associated with deliberate self-harm, above and beyond the effect of child maltreatment. However, they did not distinguish between suicidal and non-suicidal self-harm. Despite a small sample ($n = 86$) of adolescents (12–19 years), results from another study support the mediating role of *self-criticism* in the relationship between emotional abuse and NSSI, adjusting for depression (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007).

Together, these studies underscore the complexity and demonstrate our limited understanding of the pathway from child maltreatment to NSSI. Accordingly, the current study aimed to explore the effect of child maltreatment on subsequent NSSI and test the mediational properties of dissociation, alexithymia and self-blame in this relationship. It was hypothesised that child maltreatment as a combined variable, and all child maltreatment types separately, would increase risk of NSSI, with the highest risk emerging from sexual abuse, followed by physical abuse and then neglect. It was also hypothesised that dissociation, alexithymia and self-blame would at least partially mediate the relationship between child maltreatment and NSSI.

Methods

Data source

Data are from the Australian National Epidemiological Study of Self-Injury (ANESSI), a national household telephone survey of Australians aged 10–100 years conducted in 2008. The methodological approach of the survey has been described in two previous publications which used the same dataset (Martin, Swannell, Hazell, Harrison, & Taylor, 2010; Taylor et al., 2011). These previous studies focused on overall NSSI prevalence rates and methodology respectively, while the current paper focuses exclusively on the relationship between child maltreatment and NSSI.

Briefly, 40,000 households from all Australian states and territories, randomly selected from the Australian Electronic White pages, were posted written information about the study 8 weeks before telephone contact. This included an approach letter to invite participation, a participant information sheet (explaining aims, consent, anonymity, confidentiality etc.), a summary of the survey questions (included at the request of the Ethics Committee to ensure respondents were fully informed before deciding whether to participate), and lists of mental health and Indigenous health contacts.

Of the 40,000 households sampled, 11,722 were ineligible due to disconnected phone lines, fax/modems, relocations, or not being a residential property. Within each of the remaining 31,216 households, the person selected to participate was the last to have a birthday, aged 10 years or over. Although previous research indicates NSSI can occur in children aged less than 10 (e.g., Ayton, Rasool, & Cottrell, 2003), the reliability of information gained from younger children may be questionable (Borgers, Hox, & Sikkel, 2003) so they were not included. Young people aged 10–17 years required informed verbal consent from a parent or guardian before taking part. Selected households had 6 call backs before another was chosen (1 interview per household only). There was no replacement for non-contactable persons.

Of the 31,216 eligible households, 14,703 (47.1%) refused, 2,341 (7.5%) were unable to be contacted, 726 (2.3%) were unable to speak English, Italian, Greek, Vietnamese, Chinese, or Arabic, 912 (2.9%) were incapacitated and unable to be interviewed, 351 (1.1%) were unavailable, 173 (0.6%) terminated the interview, and 4 were excluded due to missing or irreconcilable data, leaving 12,006 Australians (38.5% of eligible households). Only adults aged 18–100 years ($M = 52.11$, $SD = 16.89$), are included in the current study (unweighted $n = 11{,}423$, 62.2% [$n = 7{,}103$] female) since child maltreatment was defined as occurring before age 18.

Measures

12-Month Non-Suicidal Self-Injury (NSSI)

NSSI questions were developed specifically for the ANESSI telephone interview and drawn from previous research completed by the investigators (Hasking et al., 2010; Hasking, Momeni, Swannell, & Chia, 2008; Swannell, Martin, Scott, Gibbons, & Gifford, 2008), other recent NSSI research (e.g., Klonsky & Muehlenkamp, 2007; Laye-Gindhu & Schonert-Reichl, 2005; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Whitlock, Eckenrode, & Silverman, 2006), and existing NSSI survey instruments (e.g., Functional Assessment of Self-Mutilation [FASM; Lloyd-Richardson, Kelley, & Hope, 1997]; Deliberate Self-Harm Inventory [DSHI; Gratz, 2001]; Self-Harm Behaviour Questionnaire [SHBQ; Gutierrez, Osman, Barrios, & Kopper, 2001]). Questions included a definition of NSSI, read out to all respondents: "*Self injury means deliberately hurting yourself or any part of your body without meaning to kill yourself*". Respondents were asked: "*Over the past four weeks, have you self-injured?*" (response yes/no), and if "no", "*Have you ever, in your lifetime, self-injured?*". NSSI prevalence was limited to 12 months (calculated by combining four week and lifetime NSSI with maximum 12 months recency), to reduce the impact of recall bias.

Respondents reporting NSSI were also asked about methods, number of episodes, and age of onset. Other NSSI related questions were asked but are not relevant to the current study (see Martin et al., 2010). Reported NSSI methods were inspected to ensure they met our NSSI criteria, which excluded eating disordered behaviours, risk-taking behaviours and

substance abuse. Respondents *only* reporting self-poisoning ($n = 4$) were excluded because it is primarily conceptualised as a suicide attempt (Kerr, Muehlenkamp, & Turner, 2010).

Exposure variables

Exposure variables were child maltreatment, dissociation, alexithymia, and self-blame, measured primarily with single items. Although potentially more reliable and valid, including full scales was not viable due to resource and time constraints. Reliability and validity of each exposure variable was maximised by drawing items from established full scales on the basis of face validity and strong positive correlations with the total scale.

Child maltreatment

Maltreatment questions were based on items from the Child Trauma Questionnaire (Bernstein & Fink, 1998), a widely used, valid and reliable instrument. Questions were prefaced by the statement "*Now I would like to ask you about stressful or upsetting events that sometimes happen to people. Remember that if you feel uncomfortable you can decline to answer these questions.*" Experiences were recorded in response to three separate questions: "*As a child, did you ever experience neglect from one or more parents?*" "*During your childhood, were you ever physically abused, attacked or assaulted?*" "*During your childhood, were you ever sexually abused or assaulted?*" (response yes/no). Childhood was defined as aged below 18 years (respondents were not given this number as a matter of course but it was provided by interviewers if necessary). A combination variable, 'any-child-maltreatment,' was created post hoc.

Dissociation, alexithymia, self-blame

Two items from the Dissociative Experiences Scale (Bernstein & Putnam, 1986) measured depersonalisation and derealisation: "*Sometimes people feel that other people, objects, and the world around them are not real. How often does this happen to you?*" and "*Sometimes people feel that their body does not belong to them. How often does this happen to you?*" For analysis responses were combined. Alexithymia was measured by one item from the Toronto Alexithymia Scale (Bagby, Parker, & Taylor, 1994), "*Do you find it difficult to find the right words for your feelings?*" Self-blame was measured using one item from the self-blame subscale of the Brief COPE questionnaire (Carver, 1997), "*When you are very stressed how often do you blame yourself for things that happened?*" (the other item in this subscale was "I have been criticizing myself"). The Brief COPE is a widely used 28-item scale designed to assess a broad range of coping responses. Internal reliability for this subscale has been .69 (Carver). The item has strong face validity. Responses for all three variables were always, often, sometimes, or never.

Covariates

To control for possible confounding effects, psychiatric diagnosis was specified as a categorical covariate. Mental health disorders in general may give rise to experiences of dissociation, alexithymia and self-blame, and NSSI occurs in the context of a wide range of different Axis I and Axis II psychiatric disorders (Nock, 2010). Psychiatric diagnosis was measured via the question "*have you ever been told by a doctor that you have anxiety, depression, attention deficit hyperactivity disorder, post traumatic stress disorder, or any other mental health problem?*" (which they specified; response options yes/no). For analyses, responses were recoded into mood disorder, anxiety disorder (including post traumatic stress disorder), eating disorder and personality disorder (eating and personality disorders were derived from responses to 'any other mental health problem'). These four categories were chosen given their strong associations with NSSI in previous research (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005; Claes, Vandereycken, & Vertommen, 2003; Gollust, Eisenberg, & Golberstein, 2008; Weierich & Nock, 2008). Bipolar disorder was not included in mood disorders given little evidence for an association with child maltreatment (Scott, Smith, & Ellis, 2010). To strengthen validity of psychiatric diagnosis, results from the General Health Questionnaire–12 item version (GHQ-12; Goldberg & Hillier, 1979), part of the ANESSI interview, were used to confirm psychiatric status. Respondents reporting a psychiatric diagnosis but scoring lower than the GHQ-12 threshold for detecting mental illness in the Australian community (Donath, 2001; standard scoring method; sensitivity 75.4%, specificity 69.9%), were excluded as psychiatric cases.

Age group was also specified as a categorical covariate, due to the strong negative correlation between NSSI prevalence and age (Kerr et al., 2010) and coded into 5 age groups (18–24; 25–34; 35–44; 45–54; and ≥55). The distribution of the exposures and covariates across NSSI status are shown in Table 1.

Substance abuse was not specified as a covariate because it has a strong inherent element of self-harm and may be more rightly viewed as a comorbidity of NSSI rather than a risk factor (Fliege, Lee, Grimm, & Klapp, 2009). Other demographic variables (years of education, marital status, socioeconomic status, country of birth) were not specified as covariates due to little evidence for associations with NSSI (Nock, 2010), and no differences on these variables between self-injurers and non self-injurers observed in the current sample.

Table 1
Distribution of exposure variables and covariates in self-injurers and non self-injurers.

	Males						Females					
	12 month NSSI						12 month NSSI					
	Yes (n = 64)		No (n = 4,039)		Total[a] (n = 4,320)		Yes (n = 122)		No (n = 6,494)		Total[b] (n = 7,103)	
	n	%	n	%	n	%	n	%	n	%	n	%
Child maltreatment[c]												
Sexual abuse	10	15.6	195	4.8	205	4.7	38	31.1	774	11.9	812	11.4
Physical abuse	28	43.8	616	15.3	644	14.9	61	50.0	913	14.1	974	13.7
Neglect	21	32.8	516	12.8	537	12.4	56	45.9	878	13.5	934	13.1
Any maltreatment	*35*	*54.7*	*962*	*23.8*	*997*	*23.1*	*88*	*72.1*	*1,637*	*25.2*	*1,725*	*24.3*
Psychiatric diagnosis[c]												
Anxiety disorder	23	35.9	463	11.5	486	11.3	77	63.1	1,084	16.7	1,161	16.3
Mood disorder	28	43.8	517	12.8	545	12.6	80	65.6	1,416	21.8	1,496	21.1
Eating disorder	0	0.0	0	0.0	0	0.0	3	2.5	4	0.1	7	0.1
Personality disorder	1	1.6	1	0.0	2	0.0	3	2.5	2	0.0	5	0.1
Any disorder	*34*	*53.1*	*793*	*19.6*	*827*	*19.1*	*102*	*83.6*	*1,974*	*30.4*	*2,076*	*29.2*
Dissociation												
Always	4	6.3	27	0.7	31	0.7	7	5.7	38	0.6	45	0.6
Often	6	9.4	72	1.8	78	1.8	11	9.0	86	1.3	97	1.4
Sometimes	20	31.3	742	18.4	762	17.6	58	47.5	1,234	19.0	1,292	18.2
Never	34	53.1	3,195	79.1	3,229	74.7	46	37.7	5,132	79.0	5,178	72.9
Alexithymia												
Always	14	21.9	285	7.1	299	6.9	21	17.2	329	5.1	350	4.9
Often	17	26.6	792	19.6	809	18.7	35	28.7	1,139	17.5	1,174	16.5
Sometimes	22	34.4	1,737	43.0	1,759	40.7	40	32.8	2,814	43.3	2,854	40.2
Never	10	15.6	1,206	29.9	1,216	28.1	26	21.3	2,183	33.6	2,209	31.1
Self-blame												
Always	16	25.0	197	4.9	213	4.9	35	28.7	299	4.6	334	4.7
Often	18	28.1	624	15.4	642	14.9	54	44.3	962	14.8	1,016	14.3
Sometimes	24	37.5	2,270	56.2	2,294	53.1	31	25.4	3,978	61.3	4,009	56.4
Never	5	7.8	836	20.7	841	19.5	2	1.6	1,150	17.7	1,152	16.2

Note: Aged ≥ 18 years.

[a] To the question about 12 month NSSI, 11 responded 'don't know', 2 responded 'only overdose', 4 initially responded 'yes' then changed their mind, 11 refused to answer, and 189 self-injured more than one year before the survey.

[b] To the question about 12 month NSSI, 21 responded 'don't know', 5 responded 'only overdose', 7 initially responded 'yes' then changed their mind, 9 refused to answer, and 445 self-injured more than one year before the survey.

[c] Respondents could nominate multiple types of child maltreatment and psychiatric diagnoses.

Analysis

Those who had never self-injured (females n = 6,494, males n = 4,039) were compared with those who had self-injured in the 12 months before survey (females n = 122, males n = 64). Lifetime self-injurers whose most recent episode was greater than 12 months before the survey (n = 658) were excluded. Analyses used unweighted data.

Magnitudes of univariate associations between 12 month NSSI and age group, psychiatric diagnosis, any form of child maltreatment (combined variable), specific types of child maltreatment (physical abuse, neglect and sexual abuse), dissociation, alexithymia, and self-blame were based on odds ratios with 95% confidence intervals calculated from logistic regression models (unadjusted ORs— females Table 3, column 1; males Table 4, column 1). To investigate whether any form of child maltreatment was associated with increased risk of NSSI after adjusting for age and psychiatric diagnosis, this variable was entered into a logistic regression model (exposure referent category 'no child maltreatment'). Associations between specific types of child maltreatment and NSSI (adjusted for age and psychiatric diagnosis) were investigated by examining sexual abuse, physical abuse and neglect individually in separate models, and then by simultaneously adjusting for them in one model. Exposure referent categories were 'no history' for each maltreatment type.

To determine whether dissociation, alexithymia, and/or self-blame, were intermediaries in the relationship between child maltreatment and NSSI, the four step mediation process was employed (Baron & Kenny, 1986). The Sobel test was used to determine whether the indirect effect of child maltreatment on NSSI via the potential mediators differed significantly from zero. Due to the large number of tests being conducted, all associations were tested at $p < .01$.

Results

The weighted (for age and gender) 12-month prevalence of NSSI among respondents aged ≥ 18 years was 2.2% (n = 234; 95% CI 1.9, 2.5), and was similar between males (2.1%, n = 108, CI 1.7, 2.5) and females (2.4%, n = 126, CI 1.9, 2.8). Age of onset was available for 211 respondents aged ≥ 18 years who had self-injured in the 12 months before the survey; for females the

Table 2
Methods of NSSI in the 12 months before the survey by gender, respondents aged ≥ 18 years.

	Females (*N* = 126)		Males (*N* = 108)		Total (*N* = 234)	
	n	%	*n*	%	*n*	%
Cutting	78	61.9	41	38.0	119	50.9
Scratching	71	56.3	28	25.9	99	42.3
Hitting part of the body on a hard surface	44	34.9	48	44.4	92	39.3
Punching, hitting or slapping self	43	34.1	50	46.3	93	39.7
Biting	32	25.4	24	22.2	56	23.9
Burning	29	23.0	30	27.8	59	25.2
Other	13	10.3	16	14.8	29	12.4
Don't know	0	0.0	2	1.9	2	0.9

Note: % is of all respondents aged 18 years and above who reported NSSI. Data are weighted by age and gender.

weighted mean age of onset was 18.08 years (*SD* = 9.94), and for males, it was 18.97 years (*SD* = 8.73). Methods of NSSI in the 12 months before the survey, by gender, are in Table 2.

Child maltreatment and NSSI

Odds of engaging in NSSI among respondents aged ≥ 18 years who had experienced any form of child maltreatment were higher than those who had not experienced child maltreatment for females (OR 5.63, 95% CI 3.66, 8.66) and males (OR 3.50, CI 2.06, 5.97) after adjusting for age and psychiatric diagnosis (Tables 3 and 4, column 2). When the 3 maltreatment types were entered in individual adjusted analyses as separate exposure variables, for females, each maltreatment type increased

Table 3
Females – unadjusted and adjusted associations between 12-month NSSI and covariates.

	Model 1			Model 2			Model 3		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Age group									
55+	1.00								
18–24	23.26	[12.85, 42.10]	.000						
25–34	4.23	[2.08, 8.60]	.000						
35–44	5.34	[2.91, 7.80]	.000						
45–54	2.87	[1.49, 5.51]	.002						
Psychiatric diagnosis									
No	1.00								
Yes	11.65	[7.19, 18.86]	.000						
Any child maltreatment									
No	1.00			1.00					
Yes	7.81	[5.21, 11.69]	.000	5.63	[3.66, 8.66]	.000			
Physical abuse									
No	1.00			1.00			1.00		
Yes	6.07	[4.23, 8.72]	.000	4.45	[3.00, 6.61]	.000	2.75	[1.68, 4.51]	.000
Neglect									
No	1.00			1.00			1.00		
Yes	5.39	[3.75, 7.74]	.000	4.04	[2.73, 6.00]	.000	2.56	[1.65, 3.99]	.000
Sexual abuse									
No	1.00			1.00			1.00		
Yes	3.48	[2.35, 5.16]	.000	2.70	[1.76, 4.13]	.000	1.30	[0.79, 2.14]	.297
Self-blame									
Never	1.00			1.00					
Always	54.78	[16.87, 177.90]	.000	26.44	[6.17, 113.33]	.000			
Often	22.93	[7.16, 73.42]	.000	13.01	[3.11, 54.49]	.000			
Sometimes	3.80	[1.17, 12.32]	.026	2.74	[0.65, 11.63]	.171			
Dissociation									
Never	1.00			1.00					
Always	23.20	[10.70, 50.30]	.000	10.09	[3.62, 28.09]	.000			
Often	15.47	[8.29, 28.88]	.000	10.57	[5.00, 22.35]	.000			
Sometimes	5.05	[3.49, 7.29]	.000	3.25	[2.14, 4.92]	.000			
Alexithymia									
Never	1.00			1.00					
Always	5.49	[3.11, 9.68]	.000	3.80	[1.98, 7.29]	.000			
Often	2.95	[1.81, 4.81]	.000	2.22	[1.29, 3.81]	.004			
Sometimes	1.40	[0.87, 2.25]	.161	.90	[0.54, 1.51]	.684			

Notes: CI, confidence interval; OR, odds ratio; Model 1, unadjusted; Model 2, any child maltreatment and child maltreatment types entered separately, adjusted for age and psychiatric diagnosis; Model 3, child maltreatment types entered simultaneously, adjusted for age and psychiatric diagnosis.

Table 4
Males – unadjusted and adjusted associations between 12-month NSSI and covariates.

	Model 1			Model 2			Model 3		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Age									
55+	1.00								
18–24	17.99	[6.77, 47.76]	.000						
25–34	14.63	[5.73, 37.35]	.000						
35–44	8.77	[3.42, 22.51]	.000						
45–54	5.10	[1.91, 13.63]	.001						
Psychiatric diagnosis									
No	1.00								
Yes	4.27	[2.81, 7.60]	.000						
Any child maltreatment									
No	1.00			1.00					
Yes	3.82	[2.33, 6.29]	.000	3.50	[2.06, 5.97]	.000			
Physical abuse									
No	1.00			1.00			1.00		
Yes	4.30	[2.61, 7.10]	.000	3.83	[2.22, 6.61]	.000	2.69	[1.44, 5.03]	.002
Neglect									
No	1.00			1.00			1.00		
Yes	3.31	[1.95, 5.63]	.000	3.05	[1.74, 5.35]	.000	2.05	[1.12, 3.78]	.021
Sexual abuse									
No	1.00			1.00			1.00		
Yes	3.70	[1.86, 7.39]	.000	3.35	[1.59, 7.05]	.001	1.77	[0.79, 3.94]	.165
Self-blame									
Never	1.00			1.00					
Always	12.89	[5.02, 33.11]	.000	8.62	[2.98, 24.94]	.000			
Often	5.38	[2.18, 13.28]	.003	3.01	[1.08, 8.35]	.035			
Sometimes	1.95	[0.81, 4.69]	.135	1.24	[0.46, 3.29]	.674			
Dissociation									
Never	1.00			1.00					
Always	12.12	[4.06, 36.15]	.000	8.32	[2.56, 26.99]	.000			
Often	10.18	[4.77, 21.73]	.000	5.90	[2.25, 15.49]	.000			
Sometimes	2.71	[1.63, 4.49]	.000	2.01	[1.12, 3.59]	.019			
Alexithymia									
Never	1.00			1.00					
Always	5.28	[2.51, 11.09]	.000	4.29	[1.84, 9.98]	.001			
Often	2.12	[1.03, 4.34]	.041	1.98	[0.89, 4.41]	.096			
Sometimes	1.61	[0.84, 3.10]	.153	1.19	[0.56, 2.56]	.652			

Notes: CI, confidence interval; OR, odds ratio; Model 1, unadjusted; Model 2, any child maltreatment and child maltreatment types entered separately, adjusted for age and psychiatric diagnosis; Model 3, child maltreatment types entered simultaneously, adjusted for age and psychiatric diagnosis.

the odds of engaging in NSSI— with the highest odds being for physical abuse (OR 4.45, CI 3.00, 6.61) followed by neglect (OR 4.04, CI 2.73, 6.00) then sexual abuse (OR 2.70, CI 1.76, 4.13; Table 3, column 2). For males, the odds were highest for physical abuse (OR 3.83, CI 2.22, 6.61) followed by sexual abuse (OR 3.35, CI 1.59, 7.05) then neglect (OR 3.05, CI 1.74, 5.35; Table 4, column 2). When the 3 types of maltreatment were entered simultaneously, only physical abuse (OR 2.75, CI 1.68, 4.51) and neglect (OR 2.56, CI 1.65, 3.99) increased the odds of NSSI among females (Table 3, column 3) and only physical abuse remained significant for males (OR 2.69, CI 1.44, 5.03; Table 4, column 3).

Mediation

The first set of analyses explored whether the direct effect of *any* type of child maltreatment on NSSI was mediated by dissociation, alexithymia and/or self-blame. Among females, all 3 mediators significantly reduced the direct effect of any child maltreatment on NSSI at $p < .01$, with self-blame having the largest effect (reduction of 14.6%, $p < .000$), followed by alexithymia (6.2%, $p = .009$) and dissociation (5.0%, $p = .003$; Table 5). Among males, dissociation (12.9%, $p = .003$) and self-blame (7.4%, $p < .000$), but not alexithymia (7.4%, $p = .023$) significantly reduced the direct effect of any child maltreatment on NSSI at $p < .01$ (Table 6).

The second set of analyses explored the effect of the mediators on the relationships between the individual types of child maltreatment and NSSI. Only physical abuse and neglect for females, and physical abuse for males, were examined, given they were the only child maltreatment types which uniquely increased risk of NSSI while adjusting for the other types of child maltreatment. Among females, dissociation significantly reduced the direct effects of physical abuse and neglect on NSSI (by 6.1% and 3.2% respectively, both $p = .004$), and alexithymia significantly reduced the direct effects of physical abuse and neglect on NSSI (by 6.3%, $p = .007$ and 9.4%, $p = .004$, respectively), and self-blame significantly reduced the direct effects of physical abuse and neglect on NSSI (by 13.5% and 15.6% respectively, both $p < .000$; Table 5). Among males, both

Table 5
Females, child maltreatment → mediator → NSSI (adjusted for age and psychiatric diagnosis).

		Path a			Path b			Path c'			Effect of mediator on c'		
		OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR % decrease	*Z*[a]	*p*[a]
Any child maltreatment	Self-blame	1.60	[1.41, 1.81]	<.000	5.64	[3.66, 8.67]	<.000	4.81	[3.10, 7.47]	<.000	14.56	5.41	<.000
	Dissociation	2.04	[1.49, 2.79]	<.000	5.61	[2.96, 10.63]	<.000	5.35	[3.47, 8.24]	<.000	4.97	3.40	<.000
	Alexithymia	1.22	[1.08, 1.38]	.001	2.50	[1.67, 3.74]	<.000	5.28	[3.42, 8.14]	<.000	6.22	2.60	.009
Physical abuse	Self-blame	1.59	[1.35, 1.80]	<.000	5.85	[3.81, 8.99]	<.000	3.85	[2.55, 5.80]	<.000	13.48	4.81	<.000
	Dissociation	1.85	[1.32, 2.60]	<.000	5.55	[2.94, 10.48]	<.000	4.18	[2.80, 6.24]	<.000	6.07	2.94	.004
	Alexithymia	1.28	[1.11, 1.49]	.001	2.50	[1.68, 3.73]	<.000	4.17	[2.80, 6.22]	<.000	6.29	2.70	.007
Neglect	Self-blame	1.64	[1.42, 1.90]	<.000	5.98	[3.90, 9.17]	<.000	3.41	[2.28, 5.12]	<.000	15.59	5.15	<.000
	Dissociation	1.81	[1.28, 2.55]	.001	5.97	[3.19, 11.19]	<.000	3.91	[2.62, 5.83]	<.000	3.22	2.88	.004
	Alexithymia	1.34	[1.15, 1.55]	<.000	2.45	[1.64, 3.66]	<.000	3.66	[2.45, 5.46]	<.000	9.41	2.90	.004

Notes: CI, confidence interval; OR, odds ratio; Path a is child maltreatment → mediator; Path b is mediator → NSSI, adjusted for child-maltreatment; Path c' is child maltreatment → NSSI, adjusted for mediator; Path c: any-child-maltreatment → NSSI, OR 5.63 (3.66–8.66), $p < .000$; physical abuse → NSSI, OR 4.45 (3.00–6.61), $p < .000$; neglect → NSSI, OR 4.04 (2.73–6.00), $p < .000$.

[a] Sobel test.

dissociation and self-blame significantly reduced the direct effect of physical abuse on NSSI by 12.3% ($p = .006$) and 10.7% ($p = .009$) respectively (Table 6). Alexithymia was not a partial mediator.

Discussion

Results from this study indicate that in a general population sample, maltreatment during childhood is associated with increased risk of later NSSI. In unadjusted analyses, physical and sexual abuse as well as neglect were each associated with increased odds of later NSSI. When maltreatment types were entered simultaneously, only physical abuse and neglect continued to increase odds for NSSI among females, and only physical abuse continued to increase odds of NSSI among males. This result suggests that different types of child maltreatment differentially predict later NSSI, and these differences are moderated by gender, underscoring the importance of looking for the separate effects of each type of maltreatment on NSSI risk and stratifying by gender. The association between physical abuse during childhood and later NSSI reflects previous work in this area (Paivio & McCulloch, 2004; Zoroglu et al., 2003).

The weaker finding of a relationship between sexual abuse and NSSI after adjusting for physical abuse and neglect is inconsistent with the majority of previous work. Only one other community based study, conducted with a male sample, found physical abuse, but not sexual abuse, to uniquely increase risk of NSSI (Gratz & Chapman, 2007). The lack of an independent association between sexual abuse and NSSI in our study may have been due to how sexual abuse was measured. While other studies defined and measured child maltreatment objectively (by describing particular experiences; for example, Traumatic Events Survey [TES, Elliott, 1992]; The Abuse-Perpetration Inventory [API, Lisak et al., 2000]; Childhood Abuse and Neglect Questionnaire [CANQ, Tutkun, Yargic, & Sar, 1995]; and Child Trauma Questionnaire [CTQ, Bernstein & Fink, 1998]), our study used a subjective dichotomous measure of child maltreatment which required respondents to nominate whether they self-identified as abuse/neglect victims or not. Objective measures of maltreatment may produce not only more depth to the responses, but also more reliable responses than dichotomous measures since not all people who have experienced sexual abuse will identify the acts as sexually abusive (Roosa, Reyes, Reinholtz, & Angelini, 1998).

The current study adds important information regarding associations between child maltreatment and NSSI, but does not tell the whole story. Since 45.3% of male self injurers and 27.9% of female self injurers *did not* report child maltreatment,

Table 6
Males, child maltreatment → mediator → NSSI (adjusted for age and psychiatric diagnosis).

		Path a			Path b			Path c'			Effect of mediator on c'		
		OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR % decrease	*Z*[a]	*p*[a]
Any child maltreatment	Self-Blame	1.55	[1.32, 1.82]	<.000	3.23	[1.90, 5.51]	<.000	3.24	[1.88, 5.58]	<.000	7.43	3.34	<.000
	Dissociation	3.53	[2.43, 5.12]	<.000	3.79	[1.73, 8.28]	.001	3.05	[1.76, 5.27]	<.000	12.86	2.98	.003
	Alexithymia	1.24	[1.06, 1.44]	.007	2.17	[1.29, 3.64]	.003	3.24	[1.89, 5.55]	<.000	7.43	1.99	.023
Physical abuse	Self-Blame	1.38	[1.14, 1.66]	.001	3.19	[1.87, 5.44]	<.000	3.42	[1.96, 5.98]	<.000	10.70	2.63	.009
	Dissociation	2.40	[1.63, 3.53]	<.000	4.00	[1.83, 8.76]	.001	3.36	[1.92, 5.88]	<.000	12.27	2.73	.006
	Alexithymia	1.13	[0.94, 1.35]	.189	2.22	[1.32, 3.72]	.003	3.56	[2.05, 6.20]	<.000	7.05	1.21	.227

Notes: CI, confidence interval; OR, odds ratio; Path a is child maltreatment/physical abuse → mediator; Path b is Mediator → NSSI, adjusted for child maltreatment/physical abuse; Path c' is any-child-maltreatment/physical abuse → NSSI, adjusted for mediator; Path c: any-child-maltreatment → NSSI, OR 3.50 (2.06–5.97), $p < .000$; physical abuse → NSSI, OR 3.83 (2.22–6.61), $p < .000$.

[a] Sobel test.

and likewise, 23.8% of males and 25.2% of females who *did* report child maltreatment *did not* report NSSI, other aetiological factors are clearly involved. In particular, the *context* in which child maltreatment occurs, including disruptions in attachment (perceived or otherwise), emotional maltreatment, maladaptive parenting practices, parental psychopathology, and modelling of feedback provided to the child by the parent, can interact with effects of child maltreatment to influence psychopathological outcomes, including NSSI (Beeghly & Cicchetti, 1994; Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997; Styron & Janoff-Bulman, 1997; Tantam & Whittaker, 1992; van der Kolk et al., 1996; Wekerle & Wolfe, 1996). In addition, specific characteristics of child maltreatment including duration, frequency, severity, amount of physical force, coercion used, and social responses to disclosure, also influence outcomes (Valle & Silovsky, 2002).

The variables which most strongly attenuated relationships between child maltreatment and NSSI differed by gender. Self-blame had the strongest effect for females while dissociation had the strongest effect for males. These differences may be accounted for by gender socialisation, where distressed females are more likely to cope by internalising (i.e., blaming themselves) and distressed males are more likely to cope by blocking things out (i.e., dissociating) (Pearlin & Schooler, 1978; Stone & Neale, 1984).

Overall, self-blame had the strongest effect on the relationship between child maltreatment and NSSI. Self-blame is a common long term reaction to maltreatment due to children's egocentricity (Cicchetti & Toth, 2005). In particular, the mediating properties of self-blame on the physical abuse—NSSI relationship may arise from incidents of child physical abuse occurring during disciplinary interactions with, and parental blame of, the child. Children may learn to attribute reasons for physical abuse to themselves, particularly if they were engaged in misbehaviour prior to the incident (Carlson et al., 1997; Herzberger, 1983; Wolfe & McGee, 1991). Individuals who have been physically abused might select NSSI as a coping strategy because they have learned that blame (from others and/or the self) is paired with (or leads to) direct physical injury. In contrast to self-blame, alexithymia was a weak mediator; this may have been due to our definition which included difficulty describing, but not identifying, feelings, possibly attenuating the association. Difficulty identifying feelings was related to NSSI in previous research (Polk & Liss, 2007).

The small overall percentage decrease in the child maltreatment—NSSI relationships when mediators were introduced indicates that other variables are involved. A notable possibility is depression, which is associated with child maltreatment, dissociation, alexithymia, self-blame and NSSI (Brodsky et al., 1995; Honkalampi, Hintikka, Laukkanen, Lehtonen, & Vinama, 2001; Nolen-Hoeksema & Girgus, 1995). Among the study sample, 20.7% reported a depressive disorder, higher than in the 2007 National Survey of Mental Health and Wellbeing (6.2%; Australian Bureau of Statistics, 2007). We attempted to reduce the confounding effect of depression by specifying it as a covariate.

Treatment implications

Findings from this study underscore the importance of addressing psychological processes underlying NSSI, such as self-blame and dissociation, when developing NSSI interventions for adults who have been maltreated as children. Our results also stress the importance of tailoring treatments by gender. For both male and female abuse and neglect survivors, cognitive therapy may be useful for modifying self-blaming cognitions. Cognitive therapy involves systematic testing of the accuracy of faulty attributions, searching for evidence to dispute and therefore modify them (Beck, Rush, Shaw, & Emery, 1979). Unlike static historical variables such as child maltreatment, attributional style (in this case, 'self-blame'), is dynamic in nature and potentially modifiable (Dobson, 1989). Reviews reveal cognitive therapy to be an efficacious long term treatment for depression (Dobson, 1989). At this time, no research has investigated the efficacy of cognitive therapy on reducing NSSI, but some research has shown the effectiveness of cognitive therapy in reducing deliberate self-harm more generally (Comtois & Linehan, 2006; Slee, Garnefski, van der Leeden, Arensman, & Spinhoven, 2008; Tyrer et al., 2003), although recent work adds a cautionary note in adolescents (Hazell et al., 2009). Self-blaming cognitions can also be addressed via Emotion Focused Therapy, where such emotions are experientially replaced with more adaptive emotions (Greenberg, 2004). Both dissociation and alexithymia can be addressed via training in emotion regulation, which is a module included in Dialectical Behavior Therapy (Linehan, Armstrong, Suarez, Allmari, & Heard, 1991). However, considering the wide range of psychiatric, psychological and social problems presented by patients who self-injure (Kerr et al., 2010), it is likely that mixed modality approaches are needed for this population, as with deliberate self-harm (Giesen-Bloo et al., 2006; Guthrie et al., 2001; Linehan et al., 2006; Townsend et al., 2001).

Limitations

Due to the cross-sectional design of the study we cannot empirically demonstrate that child maltreatment experiences occurred before the first episode of NSSI. However, this sequence is logically sustainable, based on other research evidence and conceptual models of NSSI. In addition, in the current study child maltreatment occurred before the most recent NSSI episode, only respondents aged $\geq$ 18 years were included in the analyses, child maltreatment was defined as occurring before 18 years, the most recent episode of NSSI had to be within the 12 months before data collection, and the average age of NSSI onset was 18.53 years, suggesting that child maltreatment occurred prior to the first episode of NSSI. Prospective research is required to confirm the temporal relationship between child maltreatment and NSSI.

The low response rate (38.5%) may have contributed to selection bias, but is consistent with other studies investigating NSSI (Whitlock, Muehlenkamp, & Eckenrode, 2008), and typical current survey research (Tourangeau, 2003). Response rates

for telephone surveys are falling worldwide (Curtin, Presser, & Singer, 2005; Groves, 2006), but they remain an efficient mode of collecting population-based data, and because of the privacy they afford, are an appropriate way to collect sensitive information such as NSSI (Forster & McCleery, 1999; Lessler & O'Reilly, 1997; Taylor et al., 2011). Post hoc analysis of Australian census data indicates that our sample was of slightly higher socioeconomic status, slightly older and contained a higher proportion of females compared to the Australian population (Australian Bureau of Statistics, 2006, 2008). Since there is little evidence for an association between NSSI and socioeconomic status (Jacobson & Gould, 2007), these differences on socioeconomic status may not have influenced our results. However, lower socioeconomic status is associated with higher rates of child maltreatment (Freisthler, Merritt, & LaScala, 2006), and our sample could have been biased towards lower reported child maltreatment compared to other work. Prevalence of reported physical abuse (16.5%) and neglect (15.1%) was indeed lower in our study compared with Australian substantiated notifications of physical abuse (21.4%) and neglect (31.7%) (Australian Institute of Health and Welfare [AIHW], 2009), but reports of sexual abuse were similar (10.8% in our study vs 10.1% from the AIHW).

Our sample was also different in regards to reported prevalence of mood disorders (20.7%) compared to the 2007 Australian National Survey of Mental Health and Wellbeing (6.2%; Australian Bureau of Statistics, 2007), probably due to differences in assessment methods (self-report diagnosis in our study vs structured clinical interview in the National Survey).

Alternatively, it is possible that individuals with psychiatric problems were more inclined to participate in our study due to their wish to contribute. However, since psychiatric diagnosis was included as a covariate in the analyses, overclassification of psychiatric diagnosis in the sample should not have affected main results.

Another limitation is the retrospective, self-report nature of the data. This is common in maltreatment research because reporting of contemporaneous maltreatment usually leads to mandatory reporting to authorities (Scott et al., 2010), and corroboration with child protection agencies is problematic due to significant numbers of cases (around 40%) not being documented (Finkelhor, 1994; Goldman & Padayachi, 2000; Widom & Morris, 1997; Widom & Shepard, 1996; Williams, 1994). The sensitive and secretive nature of both child maltreatment and NSSI makes it difficult to corroborate with family members. In addition, the self-identification nature of the maltreatment variable may have lead to misclassification (e.g., cases of self-reported sexual abuse may be misclassified as not being sexually abused, perhaps vice versa). This misclassification (based on previous studies showing an association between sexual abuse and self-harm) would likely bias relative risk estimates of NSSI for sexual abuse towards the null. For NSSI data, we attempted to minimise recall bias by limiting analyses to those respondents who had self-injured in the previous 12 months; this is in contrast to many studies which focus on lifetime NSSI. The self-report nature of psychiatric diagnosis is also a limitation, and was partially addressed by excluding those not classified as psychiatric cases (according to the GHQ-12).

To address the limitations of the current study, future research regarding pathways from child maltreatment to NSSI should employ prospective designs, attempt to substantiate child maltreatment reports, and measure psychiatric diagnosis using brief structured interviews based on standard diagnostic criteria. In addition, measures of the context in which child maltreatment occurs, and data pertaining to characteristics of child maltreatment which impact outcomes (duration, frequency, severity, perpetrator, force and coercion during sexual abuse), should be collected.

Despite its limitations, this study is the first to investigate self-blame, dissociation and alexithymia as intermediaries in the pathway from child maltreatment to NSSI in a large population-based sample. Although previous population-based studies have explored pathways from child maltreatment to deliberate self-harm and suicide, they have not distinguished between self-injurious behaviour with and without suicidal intent. Such distinctions are important because NSSI and deliberate self-harm differ in their functions and correlates (Muehlenkamp & Gutierrez, 2004). A notable strength of our study was examination of the effects of types of child maltreatment while adjusting for the effects of other maltreatment. Since child maltreatment types tends to cluster together, simply examining one type while ignoring the others may give spurious associations.

In conclusion, our results highlight both the impact child maltreatment has in the development of NSSI and suggests several potential mechanisms through which child maltreatment might lead to NSSI. Clarifying such intermediaries in the relationship between child maltreatment and NSSI is valuable because targeting and modifying self-blame, dissociation and alexithymia may contribute to the reduction or cessation of NSSI.

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