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Associations between sexual abuse and family conflict/violence, self-injurious behavior, and substance use: The mediating role of depressed mood and anger☆

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ABSTRACT

Objective: To examine whether depressed mood and anger mediate the effects of sexual abuse and family conflict/violence on self-injurious behavior and substance use.
Methods: A cross-sectional national survey was conducted including 9,085 16–19 year old students attending all high schools in Iceland in 2004. Participants reported frequency of sexual abuse, family conflict/violence, self-injurious behavior, substance use, depressed mood, and anger.
Results: Sexual abuse and family conflict/violence had direct effects on self-injurious behavior and substance use among both genders, when controlling for age, family structure, parental education, anger, and depressed mood. More importantly, the indirect effects of sexual abuse and family conflict/violence on self-injurious behavior among both males and females were twice as strong through depressed mood as through anger, while the indirect effects of sexual abuse and family conflict/violence on substance use were only significant through anger.
Conclusions: These results indicate that in cases of sexual abuse and family conflict/violence, substance use is similar to externalizing behavior, where anger seems to be a key mediating variable, opposed to internalizing behavior such as self-injurious behavior, where depressed mood is a more critical mediator.
Practice implications: Practical implications highlight the importance of focusing on a range of emotions, including depressed mood and anger, when working with stressed adolescents in prevention and treatment programs for self-injurious behavior and substance use.

Introduction

Child abuse and family conflict have turned out to be salient risk factors for emotional and behavioral problems among children and adolescents (Haggerty, Sherrod, Garmezy, & Rutter, 1996; Turner, Finkelhor, & Ormrod, 2006). Being exposed

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to sexual abuse, family conflict, and violence has for example been linked to symptoms of depression (Branje, van Doorn, van der Valk, & Meeus, 2009; Kendler, Kuhn, & Prescott, 2004; Schraedley, Gotlib, & Hayward, 1999; Turner et al., 2006) and anger and aggression (Dilillo, Tremblay, & Peterson, 2000; Turner et al., 2006). Among behavioral problems identified are self-injurious, self-harming, and suicidal behaviors (Crowell et al., 2008; Gladstone et al., 2004; Martin, 1996; Weierich & Nock, 2008), and multiple use of drugs (Harrison, Fulkerson, & Beebe, 1997; Nelson et al., 2006).

Recently, it has been suggested that depression and posttraumatic stress disorder may be important mediators in the relationship between sexual abuse and self-injurious behavior (Klonsky & Moyer, 2008; Weierich & Nock, 2008). Within the criminological literature, negative emotional reactions to stressful life experiences have similarly been hypothesized to explain delinquent behavior among adolescents (Agnew, 1992). Accordingly, adolescents who experience stressful life events may experience negative emotional reactions, which can lead to desperate avoidance or anger-based delinquency (Agnew, 1992, 2006). Agnew (2006) has argued that it is likely that particular emotional states, such as anger and depressed mood, are especially conducive to producing certain types of delinquent behavior among stressed adolescents. A recent study among sexual abuse victims has supported this suggestion (Sigfusdottir, Asgeirsdottir, Gudjonsson, & Sigurdsson, 2008) by indicating that anger was a more critical mediating variable between sexual abuse and externalizing problems of delinquency while depressed mood was a more critical mediator in the relationship between sexual abuse and internalizing problems of suicidal behavior.

Other studies have suggested that by engaging in suicidal and self-injurious behaviors individuals intend to alleviate their negative emotions (Brown, Comtois, & Linehan, 2002). Although depressed mood may be of special importance in predicting both types of internalizing behaviors, results have indicated that anger expression and self-punishment may play a more salient role when predicting non-suicidal self-injury than suicidal behaviors (Brown et al., 2002). The mediating role of depressed mood and anger in the relationship between stressful life events and self-injurious behaviors has not yet been tested.

Substance use has been categorized as an internalizing or self-directed form of delinquent behavior within the criminological literature (Agnew, 1992, 2006; Jang & Johnson, 2003) but as an externalizing behavioral problem within the psychological literature (Achenbach, 1999; Brack, Brack, & Orr, 1994). A number of studies have revealed an association between stress, depression, and alcohol use and illicit drug use (Alva, 1995; Ayerst, 1999; Barnet, Duggan, Wilson, & Joffe, 1995; Hussong & Chassin, 1993; Jang & Johnson, 2003). However, studies have also suggested that anger or aggression may be more important predictors of alcohol and drug use than depressed mood (Pardini, Lochman, & Wells, 2004; Swaim, Oetting, Edwards, & Beauvais, 1989). A prospective study showed that while depressed mood and anger co-occurred to some extent, when both emotional reactions were included in the same model, anger predicted the start of alcohol use among males but depressed mood did not predict alcohol use (Pardini et al., 2004). Similarly, a recent comprehensive longitudinal study indicated that externalizing but not internalizing problems had both proximal and lagged within-person effects on alcohol use among adolescents living in high-risk family context (Hussong et al., 2008). In line with this, substance use may be more correctly categorized as an externalizing than internalizing behavior. The inconsistency that is present in these different studies may in part be due to inadequacies in measurement, where a comprehensive indicator of anger has not been included along with a measure of depressed mood, hence under-estimating the effects of anger on substance use.

In conclusion, the mediating role of depressed mood and anger, in the relationship between stressful experiences and self-injurious behavior and substance use, is unresolved. This paper will address these important issues.

The current study

The main purpose of the present study was to examine the indirect effects of sexual abuse and family conflict/violence on substance use and self-injurious behavior through the emotional reactions of anger and depressed mood. The purpose was also to test whether the relationships under study differed by gender. Based on the literature it was hypothesised that depressed mood, related to sexual abuse and family conflict/violence, would be a stronger predictor of self-injurious behavior than anger. Anger related to sexual abuse and family conflict/violence, however, was hypothesised to be a stronger predictor of substance use than depressed mood. On the bases of research suggesting that females are more likely to internalize their reactions to stressful life events (Cyranowski, Frank, Young, & Shear, 2000; Sigfusdottir & Silver, 2009) while males may be more likely to externalize them (Brack et al., 1994; Burns & Katkin, 1993) it was hypothesised that females would be more likely to respond to sexual abuse and family conflict/violence with internalizing problems while males would be more likely to respond to these events with externalizing problems.

When testing the hypotheses we controlled for the potentially confounding influence of age, family structure, and socioeconomic status (Finkelhor, 1993; Finkelhor, Hotaling, Lewis, & Smith, 1990; Schraedley et al., 1999; Turner et al., 2006).

Method

Participants and procedure

A cross-sectional national survey was conducted including 9,085 16–19 year old students attending all high schools in Iceland on October 20th in 2004. The data represented 67% of all registered students in this age group in Iceland and

approximately 80% of all fulltime students in this age-group who, according to school registrations, should have been present in school at the day of administration. There were 4,652 (51%) females and 4,433 (49%) males in the study and the average age was 17.2 years (SD = 1.1). Anonymous questionnaires were administered by teachers. The participants had 80 min (two school lessons) to complete the questionnaires and seal them in blank envelopes. The data collection was conducted in accordance with the Privacy and Data Protection Authority in Iceland, including anonymity and participants' informed consent by and under the direction of the Icelandic Centre for Social Research and Analysis. Participants were specifically informed about the sensitivity of some questions in the survey and told that they were free not to participate and to withdraw at any time. The participants were also informed of names of places, people, and phone numbers they could contact if they wanted to talk to someone about any issues that could come up following the participation in the survey.

Measures

The study included five latent variables (parental education, depressed mood, anger, substance use, and self-injurious behavior) and four observed variables (sexual abuse, family conflict/violence, age, and family structure).

Age. The age of the participants was indicated by an ordinal variable with the values 0 = "16", 1 = "17", 2 = "18" and 3 = "19 years old" accordingly.

Family structure. The participants were asked whether they lived with both biological parents (71.5%) or in other family arrangements (28.5%). Response categories were either 1 = "living with both biological parents," or 0 = "living in other family arrangements."

Parental education. As an indicator of socioeconomic status, participants were asked 2 questions, one about the educational attainment of their mother and another 1 about the educational attainment of their father. The answers to each of the questions were 0 = "finished elementary school or less," 1 = "started a school on the secondary level," 2 = "finished secondary level," 3 = "started university level," 4 = "has a university degree." Adding the 2 questions together, responses ranged on an ordinal scale from 0 to 8.

Family conflict/violence. Four questions were used to measure family conflict/violence. The participants were asked whether they had ever experienced the following: (1) "Witnessed severe arguments between their parents," (2) "Had severe arguments with their parents," (3) "Witnessed physical violence at home including an adult," or (4) "Experienced physical violence at home, including an adult." Answers to each question had a yes (yes = 1) or no (no = 0) response indicating its occurrence. The scores for the 4 questions were added together indicating the number of family conflict/violence events experienced by each participant. Responses to the observed measure on family conflict/violence ranged on an ordinal scale from 0 (answering no to all types of events) to 4 (answering yes to all types of events).

Sexual abuse. Five questions were used to measure the severity of sexual abuse experienced by each participant before the age of 18 (Mossige, 2004). The introduction to the 5 questions was as follows: *Sometimes people are persuaded, pressed or forced to participate in sexual activities they cannot protect themselves from. The following questions are about such situations. Have you been exposed to any of the following against your will?* (1) "Somebody exposed him/herself indecently towards you," (2) "Somebody touched your body, excluding genitals, in an indecent way," (3) "Somebody touched your genitals," (4) "Somebody persuaded, pressed or forced you to touch his/her genitals," (5) "Somebody persuaded you, pressed or forced you to have intercourse." Answers to each question had a yes (yes = 1) or no (no = 0) response indicating its occurrence. Based on research encouraging the use of ordinal measures of severity of sexual abuse as opposed to dichotomous measures (Roosa, Reyes, Reinholtz, & Angelini, 1998; Russell, 1983) 3 degrees of severity of sexual abuse were defined. The "*least severe*" type consisted of questions 1 and 2, "*severe abuse*" consisted of questions 3 and 4, and "*very severe abuse*" consisted of question 5. Responses to the observed measure on sexual abuse ranged on an ordinal scale from 0 to 3 indicating 0 = "never," 1 = "least severe," 2 = "severe," and 3 = "very severe."

Depressed mood. Eight items based on the depression dimension of SCL-90, a multidimensional self-report symptom inventory, were used to measure depressed mood (Derogatis & Cleary, 1977; Derogatis, Lipman, & Covi, 1973). The participants were asked how often during the previous week each statement applied to them (see all statements in Table 1). Responses to each of the 8 statements ranged from 0 = "never," 1 = "seldom," 2 = "sometimes," to 3 = "often." Together, the total scores of this latent variable ranged from 0 to 24.

Anger. Five items based on the SCL-90, a multidimensional self-report symptom inventory, were used to assess the severity of anger problems (Derogatis & Cleary, 1977; Derogatis et al., 1973). Participants were asked how often during the previous week each statement applied to them (see all statements in Table 1). Answers to each of the 5 statement ranged from 0 = "never," 1 = "seldom," 2 = "sometimes," to 3 = "often." Added together, the total scores ranged from 0 to 15.

Table 1
Indicators for the latent constructs used in the study and descriptive statistics, by gender.

Variables	*N*		Range	Alpha[a]	Mean		SD	
	Females	Males			Females	Males	Females	Males
Parental education	4,190	3,803	0–8	.62	4.38	4.52	2.44	2.42
Mothers education			0–4					
Fathers education			0–4					
Depressed mood	4,551	4,296	0–24	.89	6.84	4.80	5.89	4.91
Felt sad or had little interest in doing things			0–3					
Felt lonely			0–3					
Cried easily or wanted to cry			0–3					
Found it difficult to fall asleep or stay asleep			0–3					
Felt blue			0–3					
Felt no interest in things			0–3					
Felt low in energy or slowed down			0–3					
Felt hopeless about the future			0–3					
Anger	4,607	4,344	0–15	.82	3.47	3.08	3.28	3.09
Easily annoyed or irritated			0–3					
Experienced temper outbursts that you could not control			0–3					
Had the urges to break or smash things			0–3					
Got into argument			0–3					
Shouted or threw things			0–3					
Self injurious behavior	4,524	4,133	0–8	.71	1.55	.98	2.30	1.85
Have you ever thought of engaging in self-injury?			0–4					
Have you ever engaged in self-injury?			0–4					
Substance use	4,585	4,263	0–30	.84	.80	1.21	2.99	3.57
Marijuana or hashish			0–6					
Amphetamines			0–6					
Ecstasy			0–6					
Cocaine			0–6					
Mushrooms as drugs			0–6					

[a] Cronbach's alpha *N* males = 4433, *N* females = 4652.

Substance use. Participants were asked how often (if ever) they had used the following substances: Marijuana or hashish, Amphetamines, Ecstasy, Cocaine, or Mushrooms as drugs. Answers ranged on a Likert scale from 0 = "never," 1 = "1–2 times," 2 = "3–5 times," 3 = "6–9 times," 4 = "10–19 times," 5 = "20–39 times," 6 = "40 times or more often." Added together, the total scores ranged from 0 to 30.

Self- injurious behavior. In order to assess the participants' self-injurious behavior, they were asked if any of the following statements applied to them: "Have you ever thought of engaging in self-injury"? and "Have you ever engaged in self-injury"? The items were rated from 0 = "no never," 1 = "once," 2 = "twice," 3 = "3 or 4 times," and 4 = "5 times or more" to each statement. Added together, the total scores ranged from 0 to 8.

Statistical analysis

Structural equation modelling (SEM) was conducted using Amos 17.0. SEM combines the well-known conventional techniques of common factor analysis and the general linear model (Arbuckle, 2008). This approach allows explicit modelling of both direct and indirect effects (mediating effects) using observed variables (directly measured), and latent variables (not directly measured but inferred from a number of observed variables) (Arbuckle, 2008; Maruyama, 1998).

SEM includes 2 main components of models, a measurement model and a structural model. First, the measurement model was specified and tested. A proper specification of the measurement model, including a good measure of the latent variables, is a necessary condition before meaning can be assigned to the analysis of the structural model (Anderson & Gerbing, 1982). Multiple-indicators are preferred when building measurement models with 2 up to about 6 indicators used as an estimate of each latent construct (Anderson & Gerbing, 1982; Anderson & Gerbing, 1988; Gerbing & Anderson, 1993). The upper limit of often 6 indicators for each latent construct can in part be explained by persistent model-to-data fit difficulties with increasing number of indicators (Anderson & Gerbing, 1982; Gerbing & Anderson, 1993). Given a good model fit, 8 indicators per latent variable have been utilized for example when studying adolescent depression (Lanza et al., 2003). Five latent variables were specified in the current study, all measured with multiple indicators: parental education (2 indicators), depressed mood (8 indicators), anger (5 indicators), substance use (5 indicators), and self-injurious behavior (2 indicators). Confirmatory factor analysis was used with all the latent variables. Factor loadings of indicators on each of the latent constructs were substantial and statistically significant. A confirmatory structural model specified the relations of the constructs to one another, as posited by the theory and hypotheses put forward (Anderson & Gerbing, 1988). Research has indicated that when considered together the appropriate measures for examining the fit of the structural model tested are the Comparative-Fit-Index (CFI), the Root Mean Square Error of Approximation (RMSEA) and the chi-square statistic

(McDonald & Ho, 2002). Generally, models are considered to constitute a good fit if the CFI is at least .90 and the RMSEA is .05 or less.

Out of the 9,113 participants, 10.8% (985) did not answer the questions on sexual abuse. For the other variables missing values were less than 5%. When dealing with missing data Amos performs estimation by full information maximum likelihood (Arbuckle, 2008). In this approach, missing values are not imputed, but all observed information is used to produce the maximum likelihood estimation of parameters, assuming missing at random (Acock, 2005; Anderson, 1957). Under the missing at random condition the probability that an observation is missing on a given variable can depend on another observed variable but not on the values of the given variable itself (Enders & Bandalos, 2001). A number of investigators have shown that full information maximum likelihood outperforms most common methods of handling missing data, including listwise and pairwise data deletion and mean substitution, resulting in more unbiased and efficient estimates than the other methods (Enders & Bandalos, 2001). An analysis of the group not answering the sexual abuse question indicated that those not answering were more likely to be males and more likely to be younger aged adolescents. No other variable in this study independently predicted missing values. Because of this, gender and age were included in the analysis of the current study.

Results

Of those who answered, a total of 2,766 (64.3%) females and 3,122 (82.28%) males answered "no" to all of the 5 questions asked about sexual abuse. A total of 681 (15.8%) females and 173 (4.6%) males reported only the least severe type of abuse, 518 (12.0%) females and 391 (10.3%) males reported severe type of abuse, and 340 (7.9%) females and 112 (2.9%) males reported the most severe type of abuse. A total of 2,543 (56.1%) females and 2,041 (48.2%) males reported having ever experienced 1 or more of the family conflict/violence events measured. Approximately half of those reported having experienced only 1 type of event and 151 females (3.3%) and 151 males (3.6%) reported having experienced all 4 types of events measured. With regards to the dependent variables, a total of 2,068 (45.7%) females and 1,314 (31.8%) males said "yes" to 1 or 2 of the questions asked on self-injurious behavior. Among females, a total of 2,050 (45.3%) reported having ever thought of engaging in self-injury and 806 (17.8%) reported having ever engaged in self-injury. Among males, 1,263 (30.4%) reported having ever thought of engaging in self-injury and 490 (11.8%) reported having ever engaged in self-injury. Finally, 778 (17.0%) females and 1,002 (23.5%) males said "yes" to 1 or more of the 5 questions asked to measure substance use. Table 1 displays the indicators for the latent constructs used in the analysis along with descriptive statistics.

Table 2 shows that the factor loadings for all items on the latent constructs were high and statistically significant ($p < .01$). The fit measures for the structural model, split by gender, demonstrated in Table 2 reveal that apart from the chi-square test which turned out to be significant due to large sample size (see Gerbing & Anderson, 1993) the model fits the data well. The structural model split by gender, has a CFI value of .91 and an RMSEA of .04, which, based on the aforementioned criteria, indicates a good fit.

The results listed in Table 3 indicate that being exposed to sexual abuse was positively related to both depressed mood (females, beta = .20, $t > 1.96$; males, beta = .08, $t > 1.96$) and anger (females, beta = .17, $t > 1.96$; males, beta = .13, $t > 1.96$). Similarly, family conflict/violence was positively related to both depressed mood (females, beta = .21, $t > 1.96$; males, beta = .24, $t > 1.96$) and anger (females, beta = .28, $t > 1.96$; males, beta = .30, $t > 1.96$). The results indicated furthermore that for both genders depressed mood was a stronger positive predictor of self-injurious behavior (females, beta = .41, $t > 1.96$; males, beta = .46, $t > 1.96$) than anger (females, beta = .17, $t > 1.96$; males, beta = .14, $t > 1.96$).

Looking at the results for the indirect (mediating) effects of depressed mood and anger in the relationship between sexual abuse and family conflict/violence on self-injurious behavior, they were positive and significant at the .05 level for both males and females. The indirect effects were stronger through depressed mood than anger for both sexual abuse (females, beta = .08, $t > 1.96$; males, beta = .04, $t > 1.96$) and family conflict/violence (females, beta = .10, $t > 1.96$; males, beta = .11, $t > 1.96$). However, anger did also play a significant role in mediating the effects of sexual abuse (females, beta = .03, $t > 1.96$; males, beta = .02, $t > 1.96$) and family conflict/violence (females, beta = .05, $t > 1.96$; males, beta = .04, $t > 1.96$) on self-injurious behavior among both genders.

Regarding substance use, the results showed that anger but not depressed mood positively predicted substance use for both genders (females, beta = .19, $t > 1.96$; males, beta = .17, $t > 1.96$). Therefore, the indirect effect of sexual abuse on substance use through anger was significant for both genders (females, beta = .03, $t > 1.96$; males, beta = .02, $t > 1.96$) as well as the indirect effect of family conflict/violence on substance use through anger (females, beta = .04, $t > 1.96$; males, beta = .04, $t > 1.96$). However, the indirect effects of sexual abuse and family conflict/violence on substance use through depressed mood were not significant. Fig. 1 demonstrates these associations between sexual abuse and family conflict/violence, self-injurious behavior and substance use, with depressed mood and anger as mediating factors.

To determine if females and males differed significantly with respect to any single parameter, AMOS was used to calculate a table of critical ratios of differences among all pairs of free parameters, where values larger than 1.96 indicated a significant difference between genders on the corresponding parameter (Arbuckle, 2008). The results indicated a few gender differences. First, sexual abuse had a significantly stronger positive effect on depressed mood among females than it did among males. Looking at Table 3, the unstandardized effects of sexual abuse on depressed mood were .13 for females, while they were .06 for males. Second, the direct effects of sexual abuse on self-injurious behaviors were stronger for females (.27) than males (.15). Looking at family conflict/violence, the only gender difference observed was in the direct effect of family conflict/violence on substance use, which was much stronger for males than females (.11 and .04).

Table 2
Standardized factor loadings for indicators on the latent constructs and fit measures for the structural model, by gender.

	Parental education Females/males	Depressed mood Females/males	Anger Females/males	Self-injurious behavior Females/males	Substance use Females/males
Parental education					
Mothers education	.59/.83				
Fathers education	.74/.53				
Depressed mood					
Felt sad or had little interest in doing things		.73/.65			
Felt lonely		.71/.74			
Cried easily or wanted to cry		.73/.56			
Found it difficult to fall asleep or stay asleep		.54/.50			
Felt blue		.85/.84			
Felt no interest in things		.80/.77			
Felt low in energy or slowed down		.72/.71			
Felt hopeless about the future		.71/.74			
Anger					
Easily annoyed or irritated			.61/.57		
Experienced temper outbursts that you could not control			.82/.78		
Had the urges to break or smash things			.77/.72		
Got into argument			.71/.70		
Shouted or threw things			.67/.70		
Self injurious behavior					
Have you ever thought of engaging in self-injury?				.87/.83	
Have you ever engaged in self-injury?				.71/.61	
Substance use					
Marijuana or hashish					.69/.58
Amphetamines					.89/.80
Ecstasy					.85/.87
Cocaine					.87/.87
Mushrooms as drugs					.67/.83
Fit measures for the structural model, split by gender					
Number of distinct sample moments				754	
Number of distinct parameters to be estimated				208	
Degrees of freedom				546	
Chi-square				8848	
CFI Baseline Comparisons				.91	
RMSEA				.04	

Note: All factor loadings are statistically significant; $p < .01$.

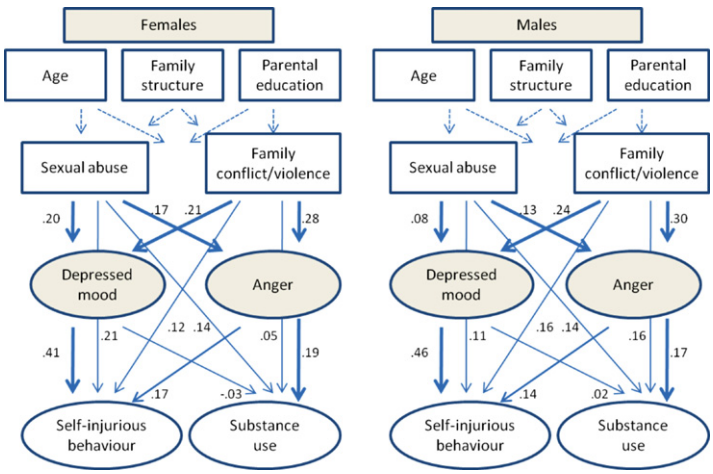

Fig. 1. Associations between sexual abuse, family conflict, self-injurious behavior and substance use, with depressed mood and anger as mediating factors, by gender.

Table 3
Standardized and unstandardized regression weights for the structural equation model with depressed mood and anger as mediating factors, by gender.

	Standardized coefficients		Unstandardized coefficients		S.E.		C.R.	
	Females	Males	Females	Males	Females	Males	Females	Males
Hypothesized relationships								
Sexual abuse → Depressed mood	.20***	.08***	.129	.055	.010	.012	12.546	4.599
Sexual abuse → Anger	.17***	.13***	.103	.086	.010	.012	10.647	7.235
Sexual abuse → Self-injurious behavior	.21***	.11***	.271	.148	.020	.023	13.600	6.461
Sexual abuse → Substance use	.14***	.14***	.104	.135	.012	.016	8.369	8.307
Family conflict/violence → Depressed mood	.21***	.24***	.128	.128	.009	.009	13.497	14.535
Family conflict/violence → Anger	.28***	.30***	.154	.152	.009	.009	16.690	16.640
Family conflict/violence → Self-injurious behavior	.12***	.16***	.141	.161	.019	.018	7.451	8.949
Family conflict/violence → Substance use	.05**	.16***	.036	.112	.012	.013	3.064	8.948
Anger → Self-injurious behavior	.17***	.14***	.357	.276	.037	.037	9.678	7.417
Depressed mood → Self-injurious behavior	.41***	.46***	.800	.865	.034	.036	23.728	23.967
Anger → Substance use	.19***	.17***	.239	.237	.023	.026	10.393	9.013
Depressed mood → Substance use	−.03	.02	−.029	.033	.019	.023	−1.487	1.429
Control relationships								
Age → Sexual abuse	−.04**	−.05***	−.037	−.037	.013	.011	−2.844	−3.195
Age → Family conflict/violence	−.02	.02	−.014	.019	.014	.014	−1.016	1.339
Age → Depressed mood	.04*	.06***	.022	.028	.008	.008	2.607	3.576
Age → Anger	−.05***	−.06**	−.028	−.027	.008	.008	−3.524	−3.478
Age → Self-injurious behavior	−.04**	.02	−.043	.018	.016	.015	−2.681	1.153
Age → Substance use	.08***	.09***	.051	.062	.010	.011	5.128	5.828
Parental education → Sexual abuse	−.08***	−.07**	−.088	−.046	.022	.016	−4.055	−2.910
Parental education → Family conflict/violence	−.02	−.02	−.024	−.020	.022	.017	−1.104	−1.194
Parental education → Depressed mood	−.07***	−.04	−.051	−.019	.014	.010	−3.632	−1.951
Parental education → Anger	−.12***	−.07**	−.077	−.032	.014	.011	−5.694	−2.948
Parental education → Self-injurious behavior	−.03	.00	−.039	−.002	.026	.017	−1.477	−.130
Parental education → Substance use	−.04	−.01	−.031	−.005	.016	.012	−1.895	−.387
Family structure → Sexual abuse	−.10***	−.05**	−.215	−.082	.032	.028	−6.698	−2.913
Family structure → Family conflict/violence	−.22***	−.23***	−.505	−.547	.033	.035	−15.097	−15.477
Family structure → Depressed mood	−.04**	−.01	−.059	−.015	.021	.020	−2.770	−.741
Family structure → Anger	.00	.02	−.001	.032	.020	.020	−.074	1.619
Family structure → Self-injurious behavior	−.03*	−.03	−.083	−.068	.040	.039	−2.051	−1.751
Family structure → Substance use	−.07***	−.03	−.115	−.043	.025	.027	−4.583	−1.594

C.R.: stands for the critical ratio for regression weight, where regression weight estimate is divided by the estimate of its standard error (S.E.).
* Significant at the .05 level (2-tailed).
** Significant at the .01 level (2-tailed).
*** Significant at the .001 level (2-tailed).

Finally, the current findings revealed that age, parental education, and family structure were confounded with other variables in the model. Most of these relationships were weak though. An exception was the strong negative relationship between family structure and family conflict/violence indicating that those not living with both parents were more likely to have experienced family conflict/violence than those living with both biological parents (see Table 3). Family structure was also the strongest demographic predictor for sexual abuse among females but a significant but weak predictor for sexual abuse among males. Parental education and age had weak negative effects on sexual abuse but not family conflict/violence, with higher education and lower age predicting less likelihood of sexual abuse.

Discussion

The current findings showed that among both males and females depressed mood was a more important mediator between stressful life events of sexual abuse, family conflict/violence, and self-injurious behavior while anger was a key mediator between these stressful life events and substance use. The results confirm the first hypothesis and support the suggestion that depressed mood may explain, at least in part, the relationship between stressful life events and self-injurious behavior (Klonsky & Moyer, 2008). Furthermore, they support prior findings, showing that depressed mood is more strongly related to internalizing behaviors than anger (Sigfusdottir et al., 2008). Additionally, the current results showed that, while depressed mood is a stronger mediator, anger also plays a significant role in mediating the effects of sexual abuse and family conflict/violence on self-injurious behavior. This supports earlier suggestions that anger expression and self-punishment are salient when predicting self-injury among stressed individuals (Brown et al., 2002).

In accordance to the second hypothesis, the effects of sexual abuse and family conflict/violence on substance use were much stronger through anger than through depressed mood. In fact depressed mood did not exert significant effects on substance use among females and males, after the effects of anger had been accounted for. This suggests that studies manifesting depressed mood as an important predictor for substance use among stressed youth, but have not taken the effects of anger into account in the same model, may have overestimated the effects of depressed mood as opposed to anger on this form of delinquency (Alva, 1995; Ayerst, 1999; Barnet et al., 1995). The current findings differ from results reporting

that depressed mood, has a substantial effect on substance use (Jang & Johnson, 2003) and alcohol use (Hussong & Chassin, 1993) while considering the effects of anger in the same model. However, because of a lack of comprehensive measures of anger in these two studies (they included one and two questions only), it is highly likely that they under-estimated the effects of anger on substance use and alcohol use. The current results are in line with research indicating that anger has greater predictive significance for substance use than other components of negative affect such as depressed mood (Curry & Youngblade, 2006; Pardini et al., 2004; Swaim et al., 1989). Hence, according to the present results substance use seems to be similar to externalizing forms of behavior such as delinquency (Achenbach, 1999; Brack et al., 1994; Hussong et al., 2008), where anger is a key mediating variable (Agnew, 2006; Brezina, 1998; Sigfusdottir, Farkas, & Silver, 2004) as opposed to a form of internalizing behavior such as self-injurious behavior, where depressed mood is a more critical mediator.

It is worth noting that the main gender differences observed in the current study were in line with prior findings and showed that sexual abuse had a significantly stronger positive effect on depressed mood among females than among males (Sigfusdottir et al., 2008). Of interest are the results that while the direct effects of sexual abuse on self-injurious behavior were stronger for females than males the direct effects of family conflict/violence on substance use were stronger for males than females. These results are in accordance with studies indicating that while females are more likely than males to respond to stressful life events, including sexual abuse, with internalizing symptoms (Feiring, Taska, & Lewis, 1999; Ullman & Filipas, 2005) males may be more likely to exhibit externalizing symptoms in reaction to certain stressful events (Brack et al., 1994; Burns & Katkin, 1993). In general, these results indicate that family conflict/violence exacerbates externalizing problems among males, while sexual abuse exacerbates internalizing problems among females. These results are in line with the suggestions that males and females may react differently to particular stressors (Aneshensel, Rutter, & Lachenbruch, 1991; Broidy & Agnew, 1997).

The current study has some limitations. First, the study is based on cross-sectional data, which makes it impossible to draw inferences about the temporal relations among the constructs studied. Therefore, this methodology cannot establish whether reported cases of sexual abuse and family conflict/violence happened before or after the reported emotional problems, self-injury and substance use. Looking forward, longitudinal studies on these issues are crucial to inform this question on temporal relation between stressful life events, emotions and behavioral problems.

Second, the study relies on self-report measures, where recall biases and inaccuracy of reported behaviors cannot be ruled out. Specifically, it needs to be pointed out that the measure of self-injurious behavior is based on 2 broad questions, whereas self-injury with and without suicidal intent is not explicitly distinguished. Within the empirical literature it remains a complex issue how to distinguish between self-injury and suicidal behaviors (Fliege, Lee, Grimm, & Klapp, 2009; Klonsky & Moyer, 2008). In the Icelandic language self-injurious behaviors and suicidal behaviors generally refer to 2 distinct concepts. Self-injury usually refers to deliberate self-injury of body tissue by for example cutting or burning, not including suicidal thoughts and behaviors. However, it is uncertain to what extent Icelandic adolescents interpret these concepts accordingly. Research has suggested that while nonsuicidal self-injury and suicide are distinct clinical phenomena, they are related whereas the former may be a predecessor of the latter (Lofthouse & Yager-Schweller, 2009). In the current data, a majority of those who reported having ever engaged in self-injury reported not having attempted suicide, or 57%. However, 43% reported having engaged in both behaviors. Whether these participants are reporting 2 distinct events, or interpreting the same events as both, remains unclear. Future studies should address this important issue by using standardized measures whereas self-injury with and without suicidal intent is explicitly distinguished. This is specifically important since emotional problems may differentially predict these 2 types of internalizing behaviors (Brown et al., 2002).

Finally, it should be mentioned that 10.8% of the participants did not answer the questions on sexual abuse. The reasons for not answering are unknown. By controlling for predictors of missing data (gender and age) and by using full maximum likelihood estimates in the presence of missing data we believe that the bias caused by the missing data was minimized in the current study.

The greatest strengths of the study are the large sample size, the sophisticated analytical strategy, the national and geographical representative nature of the data, the participation of both males and females, and the anonymity for the responders. Hence, there is a reason to be confident about the reliability of the data since the aim of the study was not to establish rates or prevalence of stressful life events, emotions, and behavior, but to conclude about the direct and indirect relationships between them.

In conclusion, the present findings suggest that depressed mood among stressed adolescents generally does not create a disposition for substance use, unless it is accompanied by anger. However, depressed mood is an important mediator between stressful life events and self-injurious behavior. These results indicate the need to focus on a range of emotional problems, including depressed mood and anger, when working with sexually abused adolescents and adolescents living under stressful conditions at home in prevention and treatment programs for self-injurious behavior and substance use.

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