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**The indirect effect of early experiences on deliberate self-harm in adolescence:
Mediation by negative emotional states and moderation by daily peer hassles**

Ana Xavier, Marina Cunha, & José Pinto-Gouveia

Abstract

The present study examines whether early experiences of threat, subordination and devaluation with family influence adolescents' negative emotional states and subsequently deliberate self-harm (DSH); and if this effect is conditioned by daily peer hassles. The sample consisted of 441 adolescents (57.6% female) with ages between 13 and 18 years old from middle and high schools. Participants completed self-report instruments measuring early memories of threat, subordination and devaluation, daily peer hassles, negative affect and deliberate self-harm behaviors. Results from conditional process analysis showed that adolescents who feel devalued and experience threat and submission within family tend to endorse high levels of negative affect, which in turn accounts for increased endorsements on deliberate self-harm. Moreover, the impact of negative affect on deliberate self-harm is amplified by the presence of moderate and high levels of daily peer hassles. This study suggests the relevance of assessing and intervening on type of emotional memories (i.e., threat, subordination and

devaluation), daily disruptions with peers and negative emotional states with adolescents who self-injure. These findings may be useful in the development of preventive and intervention programs for reducing deliberate self-harm in adolescence.

Keywords: adolescence; daily peer hassles; deliberate self-harm; early negative experiences; moderated mediation; negative affect.

Introduction

The developmental stage of adolescence is a phase of rapid changes in cognitive, emotional, psychological and social domains. These changes involve multiple complex developmental tasks mainly related to the formation of self-identity and the establishment of new interpersonal relationships. Such developmental tasks and acquisitions may be a major source of strain for adolescents and, in turn, may render them more vulnerable to the development of internalizing problems, such as depression and self-destructive behaviors (Wolfe & Mash, 2006).

Indeed, adolescents is a particularly at-risk group of engaging in deliberate self-harm, as shown by the high rates among community-based samples (14%-39%; Cerrutti, Manca, Presaghi, & Gratz, 2011; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012; Laye-Gindhu & Schonert-Reichl, 2005; Mikolajczak, Petrides, & Hurry, 2009; Muehlenkamp & Gutierrez, 2004; Ross & Heath, 2002). Deliberate self-harm (DSH) is defined as intentional, self-inflicted body tissue damage, and a culturally unacceptable behavior, regardless of the presence of suicidal intent and in the absence of a pervasive developmental disorder (Vrouva, Fonagy, Fearon, & Rousow, 2010). There is empirical evidence that DSH typically appears between the ages of 12 and 16 years old (Gratz & Chapman, 2009; Klonsky & Muehlenkamp, 2007; Klonsky, Muehlenkamp, Lewis, & Walsh, 2011) and tends to occur more often in female adolescents than male adolescents (Giletta et al., 2012; Hawton, Saunders, & O'Connor, 2012; Klonsky et al., 2011; Laye-Gindhu & Shonert-Reichl, 2005; Madge et al., 2011; Ross & Heath, 2002).

Previous research has offered remarkable contributions to the understanding of the etiology and maintenance of these pervasive and self-destructive behaviors (Hawton et al., 2012; Klonsky, 2007). Among distal factors, the adverse childhood experiences

are known to be associated with a wide range of psychological, emotional and behavioral problems (Schore, 2001). Particularly, early experiences characterized by emotional, physical and sexual abuse, neglect, criticism, invalidation, maladaptive parenting, family conflicts are linked to DSH during adolescence (Glassman et al., 2007; Jutengren, Kerr, & Stattin, 2011; Kaess et al., 2013; Madge et al., 2011) and later in life (Klonsky & Moyer, 2008; Nock, 2009).

Although the role of parental practices in the vulnerability for psychopathology is now well-established, this paper aims to explore a particular set of personal feelings and behaviors that one may experience in the early interactions with family. Some authors (Gilbert, Cheung, Grandfield, Campey, & Irons, 2003) argue that more than the recall parental behavior, it is the recall of one's feelings in an early relationship appears to be especially relevant, particularly when these interactions are characterized by dominance / subordination rank positions (Gilbert et al., 2003). According to Gilbert et al. (2003), children from early stressful and threatening environments may fear their own parents and assume forceful and involuntary subordinate behaviors (e.g., by submitting, avoiding, inhibiting assertive behavior). These behaviors are conceptualized as automatic and defensive strategies, aiming to reduce the criticism, aggression or hostile intention of the dominant other. However, these experiences, when repeated over time, can foster the development of a representation of others as hostile, dominant and powerful, as well as a sense of self as undesirable, fragile and vulnerable. Such internal representations of self and others may drastically impact on emotional, attentional and cognitive processing and social behavior (Bowlby, 1969; Gilbert, 2007; Mikulincer & Shaver, 2005). Thus, this individual tends to be overly attentive and sensitive to threats and, consequently, may be more vulnerable to developing mental health problems, such as depression, social anxiety, paranoia, shame and DSH (Castilho, Pinto-Gouveia,

Amaral, & Duarte, 2012; Gilbert, 2000; Gilbert et al., 2003; Gilbert, Baldwin, Irons, Baccus, & Palmer, 2006; Gilbert & Irons, 2009; Irons, Gilbert, Baldwin, Baccus, & Palmer, 2006; Matos, Pinto-Gouveia, & Costa, 2011; Pinto-Gouveia, Matos, Castilho, & Xavier, 2012; Xavier, Cunha, & Pinto-Gouveia, 2015).

In addition to the early adverse experiences, individual and interpersonal proximal factors have also been identified as risk factors for the development and maintenance of DSH. The interpersonal relationships with peers play a central role in the adolescent's emotional and social development. Therefore, negative relationships with peers may lead to internal distress and various forms of psychopathology. Indeed, stressful life events involving bullying, victimization, low peer preference (peer rejection), and troubles with friends were found to be associated with poor adjustment and internalizing symptoms (e.g., depression, anxiety, DSH) (Jutengren et al., 2011; Madge et al., 2011; McLaughlin, Hatzenbuehler & Hilt, 2009; McMahon, Reulbach, Keeley, Perry, & Arensman, 2012; Seidman et al., 1995). For instance, Jutengren et al. (2011) conducted a two-wave longitudinal analysis using a community sample of adolescents aged between 13 and 15 years old and found that being victimized by peers increased the likelihood to engage in DSH. Another study using a cross-national community adolescents' sample (Gilleta et al., 2012) revealed that adolescents who reported higher levels of internal distress (i.e., depressive symptoms), family-related loneliness and peer victimization are more likely to endorse DSH. Recently, Marshall et al. (2013) found that depressive symptoms predict increases in DSH one year later in a non-clinical sample of adolescents, suggesting that adolescents may use DSH as a way to cope with negative emotional states.

Therefore, the primary functions of DSH are to regulate intense and negative emotions and to modify social environments (e.g., to communicate distress and to

influence others) (Nock & Prinstein, 2004, 2005). According to Nock (2010), DSH is used as an attempt to decrease negative emotional states, resulting in a temporary tension relief and an increased desirable physiological state (automatic positive and negative reinforcement). This self-destructive behavior also involves social reinforcement functions, allowing the individual to escape or avoid interpersonal challenges or undesirable social situations (social-negative reinforcement) (Nock, 2010). In this sense, adolescents may engage in DSH as an attempt to cope with negative emotional states (e.g., depression, anxiety, shame, disgust) (Chapman, Gratz, & Brown, 2006; Marshall et al., 2013) or to cope with problems in social context, such as negative peer relationships (Jutengren et al., 2011).

In sum, there is strong empirical support for the impact of adverse experiences in childhood to vulnerability for the engagement in DSH. On the other hand, several studies have identified individual characteristics (e.g., temperament, negative emotional states, impulsivity) and proximal factors (e.g., conflicts in parent-child interactions, poor interpersonal relationships, bullying) as important risk factors for DSH. However, little is known about the potential contextual mechanisms by which distal variables may affect the onset, frequency and severity of DSH in adolescence. Moreover, more than to focus on major life events, we intend to analyze daily distressing demands within the social environment, particularly with peers and friends. Indeed, daily hassles are more proximal and tend to occur with greater frequency than major life events, and have found to be associated with adjustment difficulties and poor well-being (Seidman et al., 1995).

The purpose of this study is to examine the mechanism by which early experiences of threat, subordination and devaluation may impact on the engagement in DSH by examining negative emotional states as a mediator. Furthermore, this study also

analyses whether the effect of negative emotional states on DSH would be increased by the presence of daily peer hassles. Based on the current literature and prior research, we hypothesized that the positive association between early experiences of threat, subordination, devaluation and DSH may occur through the effect of these early negative experiences in the development of negative affective states, which in turn leads to increased levels of DSH. We also expected that the link between negative affective states and DSH might be contingent by the presence of daily peer hassles.

Method

Participants

The sample consisted of 441 adolescents, 187 are boys (42.4%) and 254 are girls (57.6%). These adolescents were between 13 and 18 years old ($M = 16.06$, $SD = 1.39$) and were attending between the 7th and 12th grades (years of education $M = 10.58$, $SD = 1.35$) in middle and high schools (which corresponds to between 7 and 12 years of school attendance). There were gender differences regarding age, $t_{(433)} = 2.486$, $p = .013$, and years of education, $t_{(371.661)} = 3.015$, $p = .003$. In this sample, girls were older ($M = 16.20$, $SD = 1.33$ vs. $M = 15.87$, $SD = 1.44$) and had more years of education than boys ($M = 10.75$, $SD = 1.26$ vs. $M = 10.35$, $SD = 1.43$).

Procedures

Participants were recruited from middle and secondary schools in the central region of Portugal. Ethical approvals were obtained from the Portuguese Ministry of Education and the National Commission for Data Protection. The Head Teacher of the schools was informed about the goals of the research and formally authorized this study. After obtaining informed and written consent from their parents, adolescents assented to

participate and were informed about the purpose of the study and aspects of confidentiality. They filled out voluntarily and anonymously to the questionnaires in the classroom. The teacher and researcher were present to provide clarification if necessary and to ensure confidential and independent responding. Pupils who were not authorized by their parents to participate in this study were excluded and were given an academic task by the teacher.

Measures

The **Early Life Experiences Scale (ELES)** (Gilbert et al., 2003; Portuguese version for adolescents by Pinto-Gouveia, Xavier, & Cunha, 2015) is composed of 15 items that assess the perceived threat, subordination and devaluation feelings in early interactions with the family. This scale comprises three subscales (Threat, Submissiveness and Unvalued) and the total score can be also computed. Respondents answer each item in a 5-point scale (1= “*completely untrue*”; 5 = “*very true*”). The original version presented good internal consistency for the ELES total score ($\alpha = .92$) and for its subscales (ranging between .71 and .89) (Gilbert et al., 2003). The Portuguese version for adolescents also presented internal reliability for total score ($\alpha = .86$) and subscales (.68 to .77) (Pinto-Gouveia et al., 2015). In the current study only the total score was used and the total scale presented good internal consistency ($\alpha = .87$).

The **Daily Hassles Microsystem Scale (DHMS)** (Seidman et al., 1995; Portuguese version by Paiva, 2009) comprises 28 items that assess the perceived daily hassles within four microsystems, such as the family, peer, school, and neighborhood contexts. For each item, respondents answer “yes” or “no” to whether the event “has not happened this month”, and if the hassle had occurred, how much of a hassle it was, on a 4-point scale (1= “not a hassle at all”; 4= “a very big hassle”). According to the authors,

if the hassle had not occurred, the answer is scored 1 in order to avoid missing values. Thus, higher scores represent greater daily hassles within each kind of microsystems interactions. In the present study, we only used the *daily peer hassles dimension*, composed of five items, which represent trouble with friends (e.g., “trouble with friends over beliefs, opinions and choices”). The original study (Seidman et al., 1995) presented a Cronbach’s alpha of .71 for daily peer hassles. In the Portuguese version (Paiva, 2009), the Cronbach’s alpha was .72. In the present study, the Cronbach’s alpha was adequate ($\alpha = .76$).

The **Positive and Negative Affect Schedule (PANAS)**; Watson, Clark, & Tellegen, 1988; Portuguese version for Children and Adolescents by Carvalho, Baptista, & Gouveia, 2004) consists of 20-item scale that comprise two mood scales, one measuring positive affect (PA; 10-items) and other measuring negative affect (NA; 10-items). Respondents are asked to rate the extent to which they have experienced each particular emotion during the past week, using a 3-point scale (1 = “*not at all*”; 3 = “*many times*”). The scores may range between 10 and 30 for each subscale and higher scores reflect greater positive affect and negative affect, respectively. In the original study, Watson et al. (1988) found high alpha coefficients, ranging from .86 to .90 for PA and from .84 to .87 for NA. The Portuguese version (Carvalho et al., 2004) obtained Cronbach’s alphas of .76 for positive affect and .83 for negative affect. Only the NA scale was used for the purposes of this study, which presented good internal consistency ($\alpha = .85$).

The **Risk-taking and Self-harm Inventory for Adolescents (RTSHIA)**; Vrouva, Fonagy, Fearon, & Roussow, 2010; Portuguese version by Xavier, Cunha, Pinto-Gouveia, & Paiva, 2013) is a self-report questionnaire for adolescents, designed to assess risk-taking and self-harm behaviors simultaneously, in both clinical and community settings. This scale consists of two dimensions: Risk-taking and Self-harm.

In this study, we only used the Self-harm (SH) dimension, composed of 17 items, that measures the frequency of self-injury behaviors, ranging from milder behaviors (e.g., picking at wounds) to more serious self-harming, such as cutting, burning, biting. The majority of items contained the word *intentionally*, and four items ended with the phrase *to hurt yourself* or *to hurt or punish yourself*. The items are rated on a 4-point scale (0 = *never*; 3 = *many times*), referring to lifelong history. Total scores were computed by summing up the responses to the 17 items of the SH dimension and higher scores indicate greater involvement in deliberate self-harm behaviors. This scale also has one categorical item to assess the absence or presence of deliberate self-harm at least once in lifelong history, followed by a question about the part(s) of the body that were deliberately injured, if applicable. The responses to this item will be used as indicator of the frequency of DSH within the sample. In the original study, the authors found a very good internal consistency for the self-harm dimension ($\alpha = .93$). The Portuguese version presented a Cronbach's alpha of .89. In the present study, we also obtained a good internal consistency for self-harm dimension ($\alpha = .89$).

Data Analysis

Statistical analyses were carried out using PASW Software (Predictive Analytics Software, version 18, SPSS, Chicago, IL, USA) and PROCESS macro for SPSS (version 2.13, released 26 September 2014; retrieved from <http://afhayes.com/introduction-to-mediation-moderation-and-conditional-process-analysis.html>). Descriptive statistics were computed to explore demographic variables and gender differences were tested using independent sample *t* tests (Field, 2013). The influence of years of education and grades were analyzed through independent one-way ANOVA (Field, 2013). The *post hoc* Tukey HSD procedure was used because it is considered the most powerful test for controlling the Type I error. However, when the

assumption of homogeneity of variances was not assumed, the *post hoc* Games-Howell comparison test was chosen (Field, 2013). Pearson product-moment correlation coefficients were computed to assess the relationships between variables (Tabachnick & Fidell, 2007).

A conditional process model, using PROCESS macro for SPSS, was performed in accordance with Hayes (2013), which is the formal integration of mediation and moderation analysis. This kind of model allows the direct and/or indirect effect of an independent variable (X) on a dependent variable (Y) through one mediator (M) to be moderated (V). Such effects are called as *conditional indirect effects*, which mean that the indirect effect (mediation) is potentially conditional on the value of one or more moderators (Hayes, 2013, 2015; Preacher, Rucker, & Hayes, 2007). The index of moderated mediation was also analyzed and estimates the quantification of the relationship between the proposed moderator and the size of the indirect effect (Hayes, 2015). The bootstrapping procedure was used to test the significance of the direct and indirect effects, since this procedure is considered as an accurate method to obtain confidence intervals in comparison to other standard methods, and is assumption-free concerning the sample distribution (Byrne, 2010; Hayes & Preacher, 2010). This procedure with 10000 Bootstrap samples was used to create 95% bias-corrected confidence intervals. The effects were considered as significantly different from zero ($p < .05$) if zero is excluded of the upper and lower bounds of the 95% bias-corrected confidence interval (Byrne, 2010; Hayes & Preacher, 2010; Kline, 2005). In the analysis the mean center for products was used. This procedure has no effect on the value of the index of moderated mediation (Hayes, 2015).

After performing analysis, it was ensured several assumptions of normality, linearity and homoscedasticity through residuals scatter plots. Additionally, data was

inspected for univariate normality and linearity and all items showed acceptable values of asymmetry and kurtosis ($Sk < |3|$ and $Ku < |8|-|10|$; Kline, 2005). Multicollinearity was examined by inspecting the tolerance and variance inflation factor ($VIF < 5$) and no multicollinearity and singularity amongst variables was found (Kline, 2005).

Results

In this sample, eighty-nine adolescents (20.2%) reported a history of engaging in DSH at least once in their lifetime. The most frequent self-injured parts of the body reported by adolescents were the hands, arms, fingers and nails ($n = 67, 77\%$). Female and male adolescents did significantly differ in frequency of DSH, $\chi^2_{(1)} = 4.402, p = .041$, indicating that females ($n = 60, 23.6\%$) were more likely to report engaging in DSH than males ($n = 29, 15.5\%$).

Descriptive statistics of the study variables are shown in Table 1 for the full sample and separately by gender (males, females). As can be seen in Table 1, there are sex differences in daily peer hassles, negative affect and DSH. Female adolescents reported higher scores in these variables than male adolescents. The effect size ranged between small and medium effects (cf. Table 1).

The means, standard deviations and ANOVA's F are also shown in Table 2. Results for age groups showed significant differences for early experiences of threat, submissiveness and devaluation, negative affect and DSH. *Post hoc comparisons*, using the *Tukey HSD* test, indicated that middle adolescence (15-16 years old) reported significantly higher levels of perceived threat, subordination and devaluation than late adolescence (17-18 years old; $p = .017$). Results also showed that middle adolescence (15-16 years old) presented higher levels of negative affect than early adolescence (13-14 years old; $p = .008$). Older adolescents (17-18 years old) reported higher levels of

negative affect than early adolescence (13-14 years old; $p = .002$). Since the assumption of homogeneity of variance was compromised for DSH scores (Levene's F test: $p < .05$), the *Welch's F* and *Brown-Forsythe's F* were used, indicating that at least two or the three age groups differ significantly on their mean scores of DSH. Results from *post hoc* comparisons, using the *Games-Howell post hoc* procedure, indicated that early adolescents (13-14 years old) reported more engagement in DSH than older adolescents (17-18 years old; $p = .006$). Participants in middle adolescence (15-16 years old) had more frequent DSH than older adolescents (17-18 years old; $p = .004$).

Regarding grade in school, results indicated significant differences for early experiences of threat, submissiveness and devaluation, negative affect and DSH. *Post hoc comparison* results, using the *Tukey HSD* test, indicated that adolescents from 7-8 grades recall more experiences of threat, subordination and devaluation in family context than adolescents from 11-12 grades ($p = .032$). The results also demonstrated that adolescents from 11-12 grades reported higher levels of negative affect than adolescents from 7-8 grades ($p = .019$). In DSH scores, *post hoc* comparisons results, using *Games-Howell* test, showed that adolescents from 7-8 grades had higher levels of DSH than adolescents from 11-12 grades ($p = .018$). All the significant differences in age and grade groups presented small effects size (cf. Table 2).

Table 3 presents the Pearson product moment correlation coefficients for all variables. As shown in Table 3, there were modest but significant correlations between early experiences of threat, subordination, devaluation and negative affect and DSH. There were moderate and significant associations between daily peer hassles and negative affect and DSH. In addition, the correlation between negative affect and DSH was moderate and significant.

The conditional indirect effects or moderated mediation was assessed with the model 14 proposed by Hayes (2013). Model 14 represents a simple mediation model with moderation of the indirect effect of X on Y through M. Specifically, this model tests whether the path, between the mediator (M) and dependent variable (Y), is moderated by a fourth variable (V) through its interaction with M. In this analyze early experiences of threat, subordination and devaluation served as the independent variable (X), negative affect served as the mediating variable (M), DSH served as the dependent variable (outcome, Y), and daily peer hassles served as the moderator variable (V) (cf. Figure 1). Demographic variables (sex and age) were also included in the model as covariates variables in order to statistically remove these potential confounding influences on the paths in the process model (Hayes, 2013).

Table 4 shows the estimated regression coefficients for this moderated mediation model. Results showed that the overall model accounted for 26% of the variance of DSH. As can be seen in Table 4, adolescents with relatively more experiences of threat subordination and devaluation presented higher levels of negative affect, $B = 0.135$, 95%CI [0.101, 0.171], $t = 7.64$, $p < .001$, even when sex and age were controlled for. Additionally, a test of moderation of the effect of negative affect on DSH depends on daily peer hassles, $B = 0.300$, 95% CI [0.001, 0.599], $t = 1.97$, $p = .047$, even when sex and age were controlled for.

The index of moderated mediation has a positive value, $\omega = 0.041$, indicating that the indirect effect of early experiences of threat, subordination and devaluation on DSH through negative affect is an increasing function of daily peer hassles. Furthermore, the bootstrap confidence interval for the index of moderated mediation does not include zero, 95% CI = 0.002 to 0.082, which supports the moderation of the

indirect effect of early experiences of threat, subordination and devaluation on DSH by daily peer hassles.

This analysis also provides the estimation of the conditional indirect effect of the early experiences of threat, subordination and devaluation (X) on DSH (Y) through negative affect (M) for various values of moderator (in this case, daily peer hassles) and tests whether the indirect effect is different from zero at those moderator values, namely “low”, “mean” and “high” in daily peer hassles levels (these labels correspond to a standard deviation below the mean, the mean, and a standard deviation above the mean). Results in these conditional indirect effects showed that there was a non-significant conditional indirect effect for low values of daily peer hassles, since the bootstrap confidence interval includes zero (value = -0.382, $B = 0.011$, 95% CI = -0.012 to 0.033). Results also demonstrated that for both the average (value = 0.000, $B = 0.027$, 95% CI = 0.007 to 0.049) and high levels of daily peer hassles (value = 0.504, $B = 0.047$, 95% CI = 0.017 to 0.087), there was a statistically significant indirect effect of early experiences of threat, subordination and devaluation on DSH through negative affect conditioned by daily peer hassles.

Discussion

This study tested whether interpersonal stressful events within the family of adolescents and their negative emotional states have an impact on the involvement in DSH and if this effect is conditioned or moderated by daily peer hassles. Consistent with findings found in prior studies on DSH among non-clinical adolescents (Cerrutti et al., 2011; Giletta et al., 2012; Laye-Gindhu & Schonert-Reichl, 2005; Ross & Heath, 2002), 20.2% of adolescents in the present study reported a history of DSH.

Concerning variables in the current study, results from sex differences showed that females report greater daily peer hassles, higher levels of negative affect and more frequent DSH than males. In addition, our findings with regard to age group differences demonstrated that participants in middle adolescence (15-16 years old) tend to experience higher levels of threatening, subordination and unvalued feelings within the family than participants in late adolescence (17-18 years old). Both middle and late adolescence reported higher levels of negative affect than early adolescence. Regarding episodes of DSH, early and middle adolescents (aged ranging between 13 and 16 years old) reported more involvement in DSH than older adolescents. The same trend was found for school years because of the strong correlation between age and years of education.

In general, these results are in accordance with the literature, demonstrating that the transition into adolescence is a vulnerable period for the development of psychopathology, namely depression and DSH (Gratz & Chapman, 2009; Klonsky & Muehlenkamp, 2007; Klonsky et al., 2011; Nolen-Hoeksema, 2001). This is especially true for girls, since several studies show that female adolescents are more susceptible than male adolescents to stressful life events (particularly, peer hassles), to depressive symptoms and to engage in DSH (Hawton et al., 2012; Madge et al., 2011; Nolen-Hoeksema, 2001; Seidman et al., 1995; Wolfe & Mash, 2006).

In line with previous research (Gilbert et al., 2003; Glassman et al., 2007; Kaess et al., 2013) and our hypothesis, adolescents who feel more threatened, subordinated and unvalued within family tend to experience more negative affect and more self-destructive behaviors. As expected, adolescents who perceived daily hassles within peer group are more likely to experience higher levels of negative affect and more frequent DSH. In addition, DSH was found to be associated with negative affect.

The current study intends to test a hypothesized model in which early threatening experiences may impact on DSH through their effect on negative emotional states. Moreover, we hypothesized that the link between negative affect and DSH would be conditioned by the presence of daily peer hassles. Thus, we conducted a conditional process analysis to test whether early experiences of threat, subordination and devaluation impacted upon DSH through their effect upon negative affect; and whether the daily peer hassles increases the effect of negative affect on DSH.

Results showed that the full model accounted for 26% of the frequency of DSH in adolescence. Accordingly with our hypothesis, adolescents who feel more threatened, subordinated and unvalued within the family tend to experience more levels of negative affect, which in turn impacts upon increased engagement in DSH. Moreover, the impact of negative affect on DSH depends on daily peer hassles. Interestingly, the impact of this interaction is more significant for adolescents who present both moderate and higher levels of daily peer hassles (but not for low levels of daily peer hassles). This finding suggests that daily peer hassles amplifies the impact of negative affect on DSH.

Overall, our findings are consistent with what researchers have argued about the impact of early interactions with significant others on the formation of internal representations of self and others, which in turn guide emotional, attentional and cognitive processing, and influence social behavior (Bowlby, 1969; Gilbert, 2007; Mikulincer & Shaver, 2005). In this sense, individuals living in stressful and fearful environments, whose parents tend to adopt harsh, critical attitudes and dominant positions towards their children, are more likely to develop negative representations of others (e.g., as hostile, critical) and of the self (e.g., as unvalued, inferior, vulnerable) and to act or behave in a subordinate way as a consequence (e.g., by avoiding, escaping from undesirable social encounters, inhibiting assertive behavior) (Gilbert et al., 2003).

This fearful subordinate/submissive style may increase the likelihood to develop depression and other psychological difficulties (Castilho et al., 2012; Gilbert et al., 2003; Pinto-Gouveia et al., 2012). In this vein, the present data suggest that the early experiences of threat, subordination and devaluation may directly cause negative affective states, which in turn impact on DSH. Furthermore, the present study adds to the current knowledge by demonstrating that the influence of negative emotional states on DSH is magnified by the presence of moderate and high levels of daily peer hassles. The same is to say that, when experienced negative affect, adolescents who perceive moderate and high levels of everyday life hassles with peers tend to engage in DSH. It seems that adolescents who struggle with the complex interplay between negative affect and daily disruptions in life with peer groups are more likely to engage in DSH.

Therefore, our findings converge on the notion that DSH may serve as an affect-regulation function, since adolescents may engage in these behaviors in an attempt to reduce or avoid a negative stimulus (e.g., negative affect) and to cope with day-to-day stressful peer experiences, albeit in a maladaptive way (i.e., automatic function) (Chapman et al., 2006; Marshall et al., 2013; Nock, 2010; Nock & Prinstein, 2004, 2005). Although stressful life experiences and negative emotional states have been previously demonstrated to confer risk for DSH (Kaess et al., 2013; Madge et al., 2011; Xavier et al., 2015), the current study advances the literature by identifying that the link between negative affect from early threatening experiences and DSH is exacerbated by the presence of moderate and high levels of daily peer hassles. Thus, the effect of negative affect on DSH seems to be particularly augmented for those adolescents who perceive greater daily hassles with their friends and peers.

These results entail some methodological limitations. Firstly, the cross-sectional nature of the data limits causal conclusions that can be drawn from our findings.

Prospective studies are needed to determine the directionality of the relations. Secondly, our data relies mainly on self-report questionnaires and future studies may benefit from other assessment methods, such as semi-structured interviews (Klonsky et al., 2011; Nock, Prinstein, & Sterba, 2010) and ecological momentary assessment (EMA; Stone & Shiffman, 1994). Third, the use of non-clinical sample does not allow us to extend our findings to clinical samples.

Nevertheless, this study offers relevant data on risk factors for DSH in adolescence. Thus, in a preventive and intervention contexts, our results suggest the relevance of assessing and intervening on the type of emotional memories (i.e., threat, subordination, devaluation). In addition, this study indicates that contextual factors, particularly daily disruptions with peers, seem to have a crucial impact on emotional states of adolescents and their lives. That is, the impact of negative emotional states on frequent DSH is potentially conditioned by the presence of moderate and high levels of daily peer hassles. In conclusion, the challenge of the preventive and intervention programs for deliberate self-harm in adolescence requires addressing both emotional development and psychosocial context.

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Table 1

Means (*M*), standard deviations (*SD*), *t*-tests for sex differences for all variables in study and effect size (*N* = 441)

Variables	Total (<i>N</i> = 441)		Males (<i>n</i> = 187)		Females (<i>n</i> = 254)		<i>t</i> (<i>df</i>)	Cohen's <i>d</i>	<i>r</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Early Life Experiences	31.18	9.69	31.94	9.57	30.62	9.76	1.418 (439)	n/a	n/a
Daily Peer Hassles	1.38	0.50	1.25	0.43	1.48	0.54	4.825*** (436.374)	-0.47	-
Negative Affect	17.75	4.10	16.34	4.14	18.78	3.76	6.469*** (439)	-0.62	-
Deliberate Self-harm	3.43	5.79	2.78	5.42	3.91	6.03	2.063* (421.822)	-0.20	-

Note. **p* ≤ .05, ****p* ≤ .001. n/a = not applicable.

Table 2

Means (*M*), standard deviations (*SD*) and One-way Analyses of Variance (*ANOVA*) for age and grade groups differences in all variables in study (*N* = 441)

	Age						ANOVA	Partial η^2
	13-14 (<i>n</i> = 71)		15-16 (<i>n</i> = 184)		17-18 (<i>n</i> = 186)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (<i>df</i>)	
ELES	32.03	9.68	32.40	9.76	29.65	9.47	4.094 (2, 438)*	.018
Daily								
Peer	1.41	0.56	1.37	0.52	1.39	0.47	0.215 (2, 438)	n/a
Hassles								
Negative								
Affect	16.21	4.40	17.91	4.23	18.17	3.73	6.258 (2, 438)**	.028
DSH	4.73	6.19	4.13	6.78	2.24	4.18	8.382 (2,176.897)***; 6.871 (2,247.530)***	.032
Grade								
	7-8 (<i>n</i> = 54)		9-10 (<i>n</i> = 123)		11-12 (<i>n</i> = 264)		ANOVA	Partial η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (<i>df</i>)	
ELES	33.98	9.46	31.73	9.93	30.35	9.54	3.465 (2,438)*	.016
Daily								
Peer	1.42	0.58	1.35	0.50	1.39	0.49	0.419 (2,438)	n/a
Hassles								
Negative								
Affect	16.52	4.53	17.38	4.25	18.17	3.89	4.353 (2,438)**	.019
DSH	5.48	6.40	3.72	5.99	2.87	5.48	4.233 (2,130.652)*;	.022

4.345

(2,179.609)**

Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. n/a = not applicable. ELES = Early Life Experiences Scale; DSH = Deliberate Self-harm measured by the Risk-taking and Self-harm Inventory for Adolescents (RTSHIA).

Table 3

Correlations (Pearson product-moment) for all variables in study ($N = 441$)

	ELES	Daily Peer hassles	Negative Affect
Daily Peer Hassles (DHMS)	.21***		
Negative Affect (PANAS)	.29***	.45***	
Deliberate Self-harm (RTSHIA)	.36***	.37***	.31***

Note. *** $p < .001$. ELES = Early Life Experiences Scale; DHMS = Daily Hassles Microsystem Scale; PANAS = Positive and Negative Affect Schedule; RTSHIA = Risk-taking and Self-harm Inventory for Adolescents.

Table 4

Unstandardized OLS Regression Coefficients with Confidence Intervals estimating negative affect (mediator variable) and deliberate self-harm (outcome or dependent variable) (N = 441)

Model	Predictors	R	R²	F(df)	B(SE)	95% CI
Mediator variable model		.45	.20	42.051 (3, 437)***		
	ELES				0.136 (0.018)***	[0.10, 0.17]
	Sex				2.489 (0.364)***	[1.77, 3.21]
	Age				0.414 (0.137)***	[0.14, 0.689]
Dependent variable model		.51	.26	14.299 (6, 434)***		
	NA				0.196 (0.073)***	[0.05, 0.34]
	ELES				0.154 (0.034)***	[0.08, 0.22]
	DPH				2.027 (0.747)***	[0.55, 3.49]
	NA x DPH				0.300 (0.152)*	[0.00, 0.59]
	Sex				0.595 (0.511)	[-0.40, 1.60]
	Age				-0.653 (0.161)***	[-0.97, -0.33]

Note. * $p \leq .05$, *** $p \leq .001$. SE = Standard error; CI = confidence interval; ELES = Early Life Experiences Scale; NA = Negative Affect (measured by PANAS); DPH = Daily Peer Hassles (measured by DHMS); NA x DPH = interaction term between Negative Affect and Daily Peer Hassles.

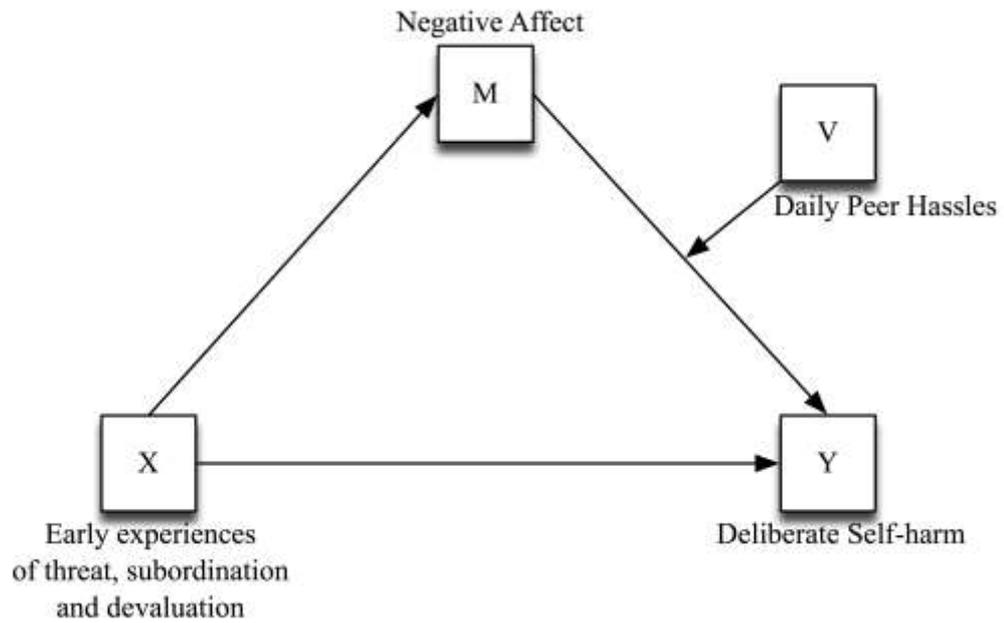


Figure 1. Daily Peer Hassles as a moderator of the mediated pathway from early negative experiences to deliberate self-harm (DSH).