

The Long-Term Effects of Bullying, Victimization, and Bystander Behavior on Emotion Regulation and Its Physiological Correlates

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Abstract

Bullying at school is a serious social problem that influences the wellbeing of everyone involved, that is, victims, perpetrators, and bystanders. Among the many health and psychological problems that these individuals may develop, emotion dysregulation appears to be a common marker. To date, however, it remains unclear whether bullying experienced during the school years is associated with emotion dysregulation also in adulthood. In this study, by adopting a retrospective approach, we investigated whether involvement in bullying at school—either as a bully, victim, or bystander—could put these individuals at risk of presenting deficits in emotion regulation in adulthood, as assessed with behavioral (explicit) and physiological (implicit) indexes (i.e., skin conductance), and whether the association between the involvement in bullying and emotion regulation was direct or mediated by other factors, such as somatic complaints and sensation seeking. A total of 58 young adults were asked to control their emotional reactions in front of images with strong emotional content, and to explicitly evaluate them with ratings, while their arousal was measured through skin conductance.

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They also responded to questionnaires about retrospective involvement in bullying, somatic complaints, and sensation seeking. Results revealed that victimization and bystander behavior were directly and negatively associated with emotion regulation as assessed with skin conductance, whereas bullying was positively associated with implicit emotion regulation through the mediation of sensation seeking. Interestingly, emotion regulation as assessed with explicit ratings was not associated with any of the characteristics of the participants. Our study suggests that being directly (as victim) but also indirectly (as bystander) involved in bullying at school time is associated with difficulties in emotional wellbeing in adulthood. Furthermore, it reveals that behavioral and physiological indexes associated with emotion regulation dissociate, suggesting that subtle physiological changes may remain hidden from explicit behavior.

Keywords

bullying, victimization, outsider behavior, long-term effects, emotion regulation, electrodermal response, retrospective design

School bullying is defined as a proactive form of aggression, frequent and repeated over time, in which an imbalance of strength or social power persists between the perpetrators and the victims, who are not able to defend themselves (Olweus, 1994). A serious type of bullying is the one carried on through relational or psychological means, such as saying bad things behind the back, withdrawing friendship, and, in particular, excluding from the group, which can be very rewarding for those who wish to manipulate social relationships and gain dominance (Chester et al., 2017). Social exclusion threatens the fundamental human need for belonging to a social group, because, differently from direct forms of bullying, it even denies the existence of the victims and makes them feel insignificant (Williams, 2007).

Consequences of Victimization, Bullying, and Bystanding Behavior

The literature mainly agrees on the fact that experiencing bullying during childhood and adolescence—either as bullies, victims, or witnesses—bears harmful and long-lasting consequences, including negative social and behavioral outcomes, as well as health and financial problems (Chester et al., 2017; Wolke et al., 2013). Victimization at school seems to be a risk factor for depression, anxiety, low self-esteem, helplessness,

and internalizing symptoms, all aspects observed both at the time when the victimization takes place, and later, during adolescence and adulthood (Lund et al., 2008; Wolke & Lereya, 2015). Specifically, for what concerns our study, literature agrees that victims are particularly at risk of developing somatic symptoms (see Gini & Pozzoli, 2009, for a meta-analysis). These refer to health disturbances (e.g., headache, stomachache, and dizziness), which cannot be fully due to medical causes, but may reflect psychological discomfort (Meerum Terwogt et al., 2006). Whatever their organic or nonorganic origins, they are usually accompanied by social or emotional distress (Rieffe et al., 2007). Being victimized by peers seems to represent a major stress associated with somatic complaints, as found by several cross-sectional or short-term longitudinal studies reporting that victimization predisposes to develop somatic complaints (Fekkes et al., 2006; Gini & Pozzoli, 2009; Herge et al., 2016). Interestingly, exposure to bullying behaviors at work is significantly associated with increased levels of both psychological health complaints and somatic complaints (Mikkelsen & Einarsen, 2002), suggesting that, at any age victimization is experienced, it particularly affects those aspects.

While the consequences of being bullied have been the focus of many developmental and social studies in the past 20 years, less has been reported for psychological and health outcomes of bullies and bystanders. Although individuals who bully others are commonly healthier and physically stronger than their peers (Wolke et al., 2001; Wolke & Stanford, 1999), there is evidence that also bullies develop a series of psychological disorders that increase their risk of failing at school, facing unemployment, making use of drugs, suffering from depression, committing self-harm, and offending (Ttofi et al., 2011b; Wolke & Lereya, 2015). Some of these aspects can be encouraged by sensation seeking, defined as a trait of personality and characterized by the willingness to feel novel and intense sensations and to take the risk of different types of experiences (Zuckerman & Aluja, 2014). Although this concept does not overlap with risk seeking, it is associated with highly risky behaviors, such as alcohol and drug assumption, risky sexual and driving behavior, gambling, and antisocial behavior (Primi et al., 2011; Zuckerman & Aluja, 2014). Literature on the association between sensation seeking and bullying is scarce; however, Lovegrove et al. (2012) report that sensation seeking increases the likelihood of being involved as bullies. Furthermore, a longitudinal study points out that children who have bullied their peers in childhood are more engaged in risky or illegal behaviors and show antisocial personality traits later in adulthood (Wolke et al., 2013), suggesting that bullying may be an early indicator of behaviors related to sensation seeking.

A last profile that emerges from the literature is the behavior of the “bystanders” or “outsiders,” defined as those who witness bullying, but commonly do not take side and do not intervene. Witnessing bullying can be a very upsetting experience, and some studies show that even this vicarious experience of victimization may give rise to negative mood, personal distress, and increasing arousal (Hosch & Bothwell, 1990; Wesselmann et al., 2009). Rivers et al. (2009) report that witnesses of bullying are at higher risk of mental health problems, including somatic complaints and substance abuse. The authors suggest that the fear of being victimized themselves or the empathic understanding of the victims’ sufferings may account for an increase in anxiety and in the development of somatic complaints, as well as in substance abuse in the attempt to decrease such feelings. However, to date, most of the literature has focused on the concurrent health and psychological outcomes of bystanders, without addressing the long-term consequences on adult behavior.

It should be noted that a series of retrospective studies provide insight into the long-term consequences of bullying experiences. Retrospective studies are performed *a posteriori*, using information on events that took place in the past and that are considered impactful for the present. As suggested by Rivers (2001), retrospective studies should not replace longitudinal studies, but they provide reliable information when a longitudinal approach is not feasible. Retrospective approaches are commonly adopted in several fields, such as in medical research and in cases of sensory deprivation, in which the adult behavior is studied in individuals who suffered congenital or early blindness, deafness, or amputation (see Nava & Röder, 2011, for a review). A few studies also applied a retrospective approach to investigate bullying, overall converging to findings obtained in longitudinal studies (see Ttofi et al., 2011a, for a systematic review of longitudinal studies), and suggesting that victimization experiences in childhood represent a major risk factor for developing a series of psychological and behavioral problems in adulthood, such as violent victimization and suicide attempts (Staubli & Killias, 2011), or anxiety, depression, sleeping problems, loneliness, and low self-esteem (Schäfer et al., 2004; Sesar et al., 2012).

Involvement in Bullying and Emotion Regulation

While specific psychological and behavioral problems seem associated with bullying-related behaviors, it is interesting to note that, among the others, dysfunctional emotional and behavioral reactions seem to be shared across different bullying experiences (Camodeca & Coppola, 2019; Shields & Cicchetti, 2001). Emotion regulation, that is the ability to regulate the

intensity, duration, and quality of an emotional experience, is one of the key features of human behavior and is foundational to one's own personal wellbeing and to healthy social relationships (Denham et al., 2003). Individuals with difficulties in emotion regulation are more likely to experience depression and rumination, to show aggressive and disruptive behavior, and to incur in psychopathological symptoms (Gross, 2002; Rieffe & De Rooij, 2012).

There is now growing interest in the physiological correlates of human behavior, and several neuroimaging studies have revealed that particularly emotions are regulated by complex neural circuits involving cortical and subcortical sites (Davidson et al., 2000). Furthermore, individuals who show dysfunctions in these circuits are more likely to display aggression and violent behavior, but impairment in these networks also characterize different psychiatric disorders, such as posttraumatic stress disorder (MacNamara et al., 2016). That is, emotion regulation/dysregulation produces specific physiological changes that can be detected through neuroimaging techniques and that usually correspond to changes in behavior.

Changes in emotional arousal are also reflected in the autonomic nervous system, which is strictly linked with the functioning of subcortical sites of the central nervous system, such as the amygdala (Morris et al., 1998). In particular, skin conductance is the typical measure used to investigate emotion processing, and studies report that individuals who are not able to control their emotions tend to display higher skin conductance responses (Hessler & Katz, 2007). Interestingly, there is evidence of emotion dysregulation and altered physiological arousal in individuals who have been involved in bullying too. For example, Janson and Hazler (2004) document that young adults experience elevated emotional arousal, measured by skin conductance and heart rate, when they recall past experiences in which they were victims of bullying, sexism, homophobia, or corporal punishment, and that their reactions are as severe as those found in populations suffering from posttraumatic stress disorder or other serious traumas. A similar pattern emerges for outsider behavior too, which seems associated with emotion dysregulation (Camodeca & Coppola, 2019) or with other aspects related to difficulties in emotion regulation, such as personal distress, somatization, and anxiety (Rieffe & Camodeca, 2016; Rivers et al., 2009). For example, the facial temperature of witnesses of ostracism in a computer game increases in respect to an inclusion condition, indicating a high autonomic arousal, which is similar to the one observed in victims (Paolini et al., 2016).

In bullies, there is more controversy as to whether they display high or low arousal in emotion regulation tasks and whether they tend to under- or over-regulate emotions (Robertson et al., 2012). Individuals who have

difficulties in regulating a discomfoting, overwhelming, emotional state (e.g., anger and fear) may present aggressive behavior in the attempt to reduce such distress; however, also emotion inhibition can lead to aggressive behavior, because it employs cognitive resources, which could be otherwise used to analyze the situation and think at proper responses (Robertson et al., 2012). The fact that bullies appear both reactively and proactively aggressive, that is, both dominated by uncontrollable anger and able to use aggression in a deliberate way, seems to confirm a double pattern of emotion regulation in these individuals, who may under- or over-control their emotional responses (Camodeca et al., 2002).

The studies mentioned above suggest that emotion regulation is a key factor associated with experiencing bullying as a victim, a bully or a bystander, and that more physiological data are needed to observe whether bullying experiences in childhood carry long-term consequences both on behavioral and physiological expressions of emotion regulation.

The Present Study

Given these premises, in this study we employed a retrospective design to investigate whether experiences of victimization, bullying, and bystander behavior during school time may have long-term consequences on emotion regulation in adulthood, as measured by means of behavioral (i.e., questionnaires) as well as physiological responses assessed with skin conductance. In this way, we could examine emotion regulation using an explicit and implicit approach, respectively.

According to the literature, we expected a lower degree of emotion regulation in victims and bystanders, because they commonly develop negative affect, elevated levels of anxiety, and get more easily aroused (Camodeca & Coppola, 2019; Paolini et al., 2016; Shields & Cicchetti, 2001; Wesselmann et al., 2009). We did not formulate specific hypotheses for bullies, who may be hyper-reactive and unable to control their emotions, as reactively aggressive individuals, but may also show an apparent ability to manage their reactions in front of situations of fear or anger, also considering their deficits in empathic concern, which mirrors a proactively aggressive attitude (Camodeca et al., 2002; Robertson et al., 2012).

Furthermore, we also hypothesized that the association between bullying-related behaviors and emotion regulation would be mediated by different psychological mechanisms, which are associated with bullying involvement. More specifically, we predicted that a high level of somatic symptoms would mediate the link between previous experiences of victimization and emotion regulation. Focusing on one's own physical symptoms makes individuals worry, anxious,

concentrated on themselves, and unable to employ effective coping strategies, which can further increase their distress and make them incapable of relaxing and regulating arousal (Mazzone & Camodeca, 2018; Meerum Terwogt et al., 2006). For bullies, we expected that sensation seeking would mediate the relationship between bullying and emotion regulation, because the need for strong sensations and excitement activates individuals to continuously intensify the behavior in which they are involved in order to increase the thrill. Finally, studies suggest that children involved as bystanders, similarly to bullies, may present characteristics referring to exciting experiences, such as substance abuse, but they also develop internalizing problems and somatic symptoms, as victims do (Rivers et al., 2009). For these reasons, we hypothesized that both sensation seeking and somatic complaints would work as mediators in the relationship between outsider behavior and emotion regulation.

To exclude that current involvement in bullying may mask the effects of bullying experiences in childhood and adolescence, we controlled for current bullying-related behaviors. We also controlled for gender, age, and period in which episodes took place, because they could have an effect and influence the relationships between variables.

To conclude, to the best of our knowledge, this is the first retrospective study to analyze whether having experienced victimization, bullying, or outsider behavior is associated with activity in the autonomic nervous system, as assessed using skin conductance in an emotion regulation task. Because changes in skin conductance are influenced by emotional experiences that occur even outside conscious awareness, we were particularly interested in observing whether the consequences of bullying-related behaviors could be detected at a more subtle level, and not only at a more explicit level, as reported in previous studies investigating long-term effects on mental, physical, and social problems (Ttofi et al., 2011a, 2011b; Wolke & Lereya, 2015). Thus, this work expands the literature on the long-term consequences of bullying-related behaviors, by shedding new light on the way in which individuals unconsciously process emotions, which, in turn, may affect physical and psychological wellbeing, independently from more explicit processes.

Method

Participants

Participants were 58 young adults (47 women and 11 men) aged 23.41 years on average ($SD = 3.69$; range 18–40), mainly undergraduate students, attending either bachelor courses or master courses in psychology and economics. Four of them had already obtained their master degree. Participants

were recruited at the University of Milan-Bicocca, in northern Italy, through the local system to manage experiments (Sona System). All participants were Italian and had a similar level of education. They came from urban areas, that is, either from the city of Milan or from the surroundings; none of them came from rural areas. All participants were healthy, right-handed, and had no visual impairment. All participants were asked if they had experienced any traumatic life event during their childhood and adolescence, but none of them recalled any traumatic experience (except being involved in bullying, as assessed using the bullying questionnaire).

Participants were tested on the emotion regulation task and responded to the bullying questionnaire in a quiet room of the Department of Psychology, after having signed an informed consent. They responded to the other questionnaires through an online platform within 1 week. The study was approved by the Ethical Committee of the University of Milan-Bicocca, in accordance to the ethical guidelines of the Declaration of Helsinki for the testing of human subjects.

Stimuli and Procedure: Emotion Regulation Task

In the emotion regulation task, a selection of images drawn from the International Affective Picture System (IAPS) database (Center for Emotion and Attention [CSEA], University of Florida) was presented on a computer screen. The IAPS is a standardized set of almost a thousand color photographs that are designed to evoke neutral (e.g., flowers and trains) reactions and a range of strong emotional responses, both positive (e.g., sexual scenes) and negative (e.g., mutilations and threat scenes). The images were selected according to their level of arousal, as assessed by the Self-Assessment Manikin (Lang & Bradley, 2007). The images we chose presented a negative content, able to elicit strong emotions such as anger, fear, and disgust. The presentation of the images started after 1000-ms fixation cross and lasted up to 10 s. We presented two blocks of 25 different images each. In one of them, participants were asked to simply watch the images (baseline condition); in the other block, we gave participants the instructions to control their emotional reactions and try to relax, while watching images (relax condition). The order of presentation of the two conditions was balanced across participants.

Throughout the task, participants' changes in arousal were measured through skin conductance (MP150, Biopac System). The amplifier was connected to a laptop that recorded the physiological changes. Two electrodes were applied to the second and fourth digit of the left hand of the participants, and a third electrode was applied close to the elbow as reference electrode. The analyses were performed using the software "AcqKnowledge," provided

with the skin conductance module. The data were high-band filtered at 0.05 Hz and we extracted for each participant the so-called “peak-to-peak” index, which calculates the difference between the lowest and the highest peak within each trial/event. This measure is particularly useful in even-related designs, as it establishes a trial-by-trial baseline. We calculated an implicit score for emotion regulation as the difference between the baseline and the relax conditions.

Questionnaires

Retrospective bullying and victimization. A modified and shortened version of the Retrospective Bullying Questionnaire (Schäfer et al., 2004) was employed, as follows. A definition of bullying was initially provided:

Bullying is an intentional hurtful behaviour. It can be enacted with physical, verbal, or psychological means. It is often repeated and characterised by an inequality of power so that it is difficult for the victim to defend him/herself. Please, think back to your school days. You may have been involved in some way or seen some bullying at school. Can you remember the frequency of the following episodes? (Schäfer et al., 2004)

We focused on the items assessing relational bullying dynamics, that is one for victimization (“Some of my classmates told lies or bad things about me or intentionally excluded me”), one for bullying (“I told lies about some of my classmates or excluded him or her”), and one for outsider behavior (“I witnessed episodes in which someone was left alone or excluded from the group”). Participants indicated the frequency with which they were subjected to and enacted each of the described behavior on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*almost always*). Table 1 presents mean scores and standard deviations.

The Retrospective Bullying Questionnaire also included a question about the period of occurrence of bullying episodes and a question about current involvement. As to the former, we asked participants when they had suffered from, perpetrated, or witnessed bullying; response alternatives included “*Never*,” “*Mainly in primary school*,” “*Mainly in middle school*,” “*Mainly in secondary school*,” “*Mainly in primary and middle school*,” “*Mainly in middle and secondary school*,” and “*Always*.” Current bullying was assessed by asking participants to think about the last 6 months, and to respond whether they suffered from, had perpetrated, or had witnessed bullying actions in the place in which they studied or worked. Responses were on a 6-point scale from 1 (*Never*) to 6 (*Almost every day*).

Table 1. Mean Scores (and Standard Deviations) of Study Variables and Correlations Among Them.

Study variables	1	2	3	4	5	6	7
1. Bullying		.10	.14	.29*	.21	.12	-.10
2. Victimization			-.00	.28*	-.31*	-.17	.18
3. Outsider behavior				.00	.00	-.19	-.23
4. Somatic complaints					.05	.01	.23
5. Sensation seeking						.15	.04
6. Emotion regulation SC							.09
7. Emotion regulation ratings							
<i>M</i> (<i>SD</i>)	1.55 (0.68)	2.72 (1.04)	3.24 (0.96)	1.93 (0.61)	2.86 (0.78)	.04 (0.34)	.03 (0.33)

Note. SC = skin conductance.

* $p < .05$.

Somatic complaints. We employed the Somatization Scale from the *Symptom Checklist-90-R* (Derogatis & Cleary, 1977; Italian adaptation by Sarno et al., 2011), asking participants whether they suffered from 12 physical symptoms (e.g., headache, nausea, and weakness) in the last 3 months. Their answers were recorded on a 5-point scale from 1 (*not at all*) to 5 (*very much*). Reliability was $\alpha = .81$. Descriptive statistics are shown in Table 1.

Sensation seeking. The Italian version (Primi et al., 2011) of the Brief Sensation Seeking Scale was employed (Hoyle et al., 2002). It consists of eight items regarding behaviors that include thrill and experience seeking, boredom susceptibility, and disinhibition (e.g., “I’d like to have new and exciting experiences, even if they are illegal” and “I’d like trying bungee-jumping”). Participants responded on a 5-point Likert-type scale (1 = *I do not agree*; 5 = *I completely agree*). Cronbach’s alpha was .80. Table 1 indicates mean scores and standard deviations.

Emotion regulation. During the emotion regulation task (both in the baseline and in the relax condition), after the presentation of each image of the IAPS, a question appeared on the screen, asking: “How intense was this image to you?” The participants had to enter a number between 1 (corresponding to “*not at all*”) and 5 (corresponding to “*extremely intense*”) to rate how much the image elicited a strong emotional reaction to them. In this case too, ratings

in the relax condition were subtracted from ratings in the baseline condition, in order to obtain an explicit score indexing the ability of the participants to regulate their emotions, based on behavioral responses.

Statistical Analyses

Descriptive statistics and correlations among study variables were calculated (see Table 1). We run regressions using the PROCESS procedure for SPSS (Hayes, 2017), which, through a series of regressions including all predictors in one block, tests the effect of independent variables on mediators, the effect of independent variables and mediators on dependent variables, and the indirect effects. This procedure yields unstandardized coefficients, generates direct and indirect effects, allows to test for multiple mediators, and calculates the indirect effect of each mediator after controlling for other mediators. A mediation effect occurs when the predictor influences the mediator, and the mediator, in turn, influences the dependent variable (Preacher & Hayes, 2004). We employed retrospective bullying-related behaviors as independent variables and emotion regulation, operationalized with questionnaire responses and with skin conductance, as dependent variable. The somatic complaints variable was a mediator when victimization was the predictor, whereas sensation seeking was the mediator when bullying was the predictor. Both somatic complaints and sensation seeking were entered as mediators when outsider behavior was the predictor. Covariates were also included to control for gender, age, current level of bullying-related behaviors, and period in which bullying occurred (primary, middle, secondary school, or a combination of them). We employed Model 4 in Process and bootstrapping with 10,000 resamples to compute 95% confidence intervals (seed = 123,456). Confidence intervals that do not contain 0 denote statistically significant effects (Preacher & Hayes, 2004). No significant outliers emerged with the Grubbs' test.

Results

Using a post hoc power analysis, based on linear multiple regression, with an effect size of 0.20, an error probability of 5%, and a total sample size of 58, the power was 0.92.

Correlations among main study variables indicated that school victimization was correlated with sensation seeking, negatively, whereas both victimization and bullying were correlated with somatic complaints, positively (see Table 1).

In the regressions, we first examined the effects of bullying-related behaviors and covariates on mediators. No significant effects were found for somatic complaints, whereas being a male and having a low involvement in current bullying were associated with sensation seeking ($R^2 = .30$; $p < .01$; gender: $B = -.45$; $p < .001$; current bullying: $B = -1.81$; $p < .05$).

Second, we analyzed the direct effects on explicit (i.e., ratings) and implicit, physiological (i.e., skin conductance responses) emotion regulation. As shown in Table 2, regressions coefficients were not significant when explicit emotion regulation was the dependent variable (see left side of Table 2), independently from bullying roles and mediators. Instead, results showed significant associations when physiological emotion regulation was the outcome, as we are going to explain in the following. Results on the right side of Table 2 show that being a woman was positively associated with implicit emotion regulation in all equations. Victimization and outsider behavior predicted emotion regulation negatively, and sensation seeking predicted it positively. The period in which an outsider behavior was reported was associated positively with emotion regulation. An analysis of variance (ANOVA) was run to check whether emotion regulation differed according to the periods of occurrence of outsider behavior, but it did not yield significant outcomes.

Third, we investigated the indirect effects of retrospective bullying-related behaviors on emotion regulation through somatic complaints and/or sensation seeking. Again, results were not statistically significant for explicit emotion regulation. Victimization and outsider behavior were not indirectly associated with implicit emotion regulation either. However, we found a mediation effect for bullying: A high level of retrospective bullying increased sensation seeking, which, in turn, increased physiological emotion regulation ($B = .04$; confidence interval [CI]: lower limit [LL] = .002; upper limit [UL] = .128; see Figure 1).

Discussion

In this study, we show that experiences as victims or bystanders in school time are associated with difficulties in emotion regulation in adulthood, as measured through skin conductance. In particular, our results reveal that being victimized or having witnessed bullying in the past is a risk factor per se, independently from any link to somatic complaints or sensation seeking and from any experience of victimization or witnessing harassment in the present. Our findings corroborate previous studies showing that victims of bullying may incur long-term consequences of their experiences, manifesting problematic psychological and health functioning (Wolke et al., 2013). In particular, victims of relational bullying, being troubled in childhood by social exclusion,

Table 2. Unstandardized Regression Coefficients of Retrospective Victimization, Bullying, and Outsider Behavior, Somatic Complaints, Sensation Seeking, and Covariates on Emotion Regulation Operationalized With Ratings (Explicit) and Skin Conductance (Implicit).

Predictors	Emotion Regulation (Ratings)			Emotion Regulation (Skin Conductance)		
	R ²	B	95% CI	R ²	B	95% CI
IV: Victimization	.12			.22*		
Victimization		.07	[-.04, .18]		-.11*	[-.21, -.00]
Somatic complaints		.11	[-.05, .26]		.02	[-.13, .17]
Gender		.05	[-.08, .18]		.21**	[.09, .33]
Age		.00	[-.02, .03]		.02	[-.00, .05]
Current victimization		.09	[-.61, .78]		.20	[-.48, .88]
Period		-.04	[-.11, .02]		.02	[-.04, .08]
IV: Bullying	.06			.27*		
Bullying		-.05	[-.20, .08]		.05	[-.08, .18]
Sensation seeking		.07	[-.07, .21]		.16*	[.03, .28]
Gender		.11	[-.04, .25]		.24***	[.12, .37]
Age		.00	[-.03, .04]		.02	[-.01, .05]
Current bullying		-.08	[-.99, .83]		-.03	[-.86, .81]
Period		.03	[-.08, .13]		-.01	[-.10, .09]
IV: Outsider behavior	.14			.36**		
Outsider behavior		-.08	[-.19, .02]		-.09*	[-.18, -.00]
Somatic complaints		.10	[-.05, .25]		-.08	[-.22, .05]
Sensation seeking		.05	[-.08, .18]		.18**	[.07, .29]
Gender		.08	[-.06, .22]		.29***	[.16, .41]
Age		-.00	[-.03, .03]		.01	[-.01, .04]
Current outsider behavior		.01	[-.12, .13]		.01	[-.10, .12]
Period		-.00	[-.07, .06]		.06*	[.00, .11]

Note. IV = independent variable. Period = period in which corresponding behavior took place (primary, middle, secondary school, or a combination of them). Boys = -1; girls = +1. CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

may develop a high sensitivity to rejection and incorporate the role of suffering victim in their self-image; this, in turn, may lead them to be extremely anxious and hypervigilant to stress, preventing them to normally react to painful and stressful experiences (Mazzone et al., 2017; Rosen et al., 2009). A similar pattern is observed for outsider behavior; indeed, it is possible that

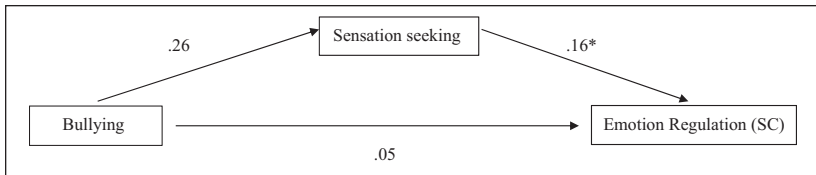


Figure 1. Unstandardized coefficients of direct and indirect associations between retrospective bullying, sensation seeking, and implicit emotion regulation operationalized with SC.

Note. Indirect effect: bullying → sensation seeking → emotion regulation ($B = .04$; CI: LL = .002; UL = .128). SC = skin conductance; CI = confidence interval; LL = lower limit; UL = upper limit.

* $p < .05$.

individuals who witness bullying episodes develop hypervigilance and susceptibility as well. Although this outcome needs replication, because no studies investigated long-lasting consequences of outsider behavior on emotion regulation, it seems to support those findings claiming health and psychological consequences also in observers of harassment (Janson & Hazler, 2004; Rivers et al., 2009).

A different pattern emerges for bullying, which is not directly associated with emotion regulation, although an indirect relation appears through the mediation of sensation seeking. It is likely that children who exclude peers, or talk behind their back, feel excitement in harassing others, experience a sense of dominance, and do not fear punishment. This sense of power may make them more and more prone to look for other types of excitement and to incur in various risk behaviors. Their threshold of distress may rise and they may likely become more equipped to soothe the intensity of their emotional reactions due to disgust or fear. In line with a previous study (Mazzone et al., 2017) that also found a low arousal in bullies, we can hypothesize that bullies get involved in risky behaviors to search for exciting stimuli, maybe in the attempt to increase their low level of arousal, which could be unpleasant for aggressive individuals. But, in this way, they become more and more desensitized to threatening cues, which can have consequences for their capacity to properly react to them. It remains unclear, with the present paradigm, whether bullies' emotion regulation is functional and comparable with the one of individuals not involved in bullying, or whether it represents an over-regulation indicating insensitiveness or pleasure in front of distressing scenes. Further studies could investigate whether other variables that account for bullies' insensitiveness in front of others' sufferings, such as low empathy or callous-unemotional traits (Baroncelli & Ciucci, 2014), may also translate into a blunted physiological reaction to diminished arousal.

For all bullying-related behaviors, we only found a modulation in skin conductance response and not in explicit emotion regulation. Our suggestion is that higher levels of cognitive mechanisms may enable individuals to develop coping strategies to apparently regulate their emotions. For instance, social norms and masking of explicit feelings may regulate the adults' behavior. On the contrary, physiological reactions cannot be masked, as they occur even outside our conscious behavior (Morris et al., 1998). In particular, skin conductance is commonly used in priming and backward masking paradigms, in which the unconscious processing of emotions is investigated, thus proving a robust technique to observe physiological changes that commonly do not match the behavioral response (Esteves et al., 1994). In this vein, our results suggest that victims and bystanders may have long-term difficulties in emotion regulation that are signaled by physiological changes in arousal.

A series of limitations of the study should be acknowledged. First, our sample was small and mostly included Italian women, either undergraduate or graduate students, which restricts the investigation to a specific part of the population. The fact that the sample was recruited from the university also suggests that the socio-economic status may have been limited to mostly middle-class individuals. Further studies are encouraged to enlarge the sample in order to generalize results to different populations. As to instruments, beyond the lab task, only self-reports were included and only one item per each bullying-related behavior was employed. Furthermore, retrospective recollection of past episodes could have been biased by mood or affective tone of memories. For instance, it is possible that currently suffering from somatic complaints or being involved in deviant behavior could lead to overestimate memories about victimization and bullying (Schäfer et al., 2004). However, a few studies found similar results using retrospective and longitudinal designs (Smithyman et al., 2014) and claimed that memories of bullying episodes are quite stable during time, although not very detailed (Rivers, 2001). Finally, we did not measure other intervening variables, such as temperament or environmental conditions, and we do not have information about personal experiences or psychological and social difficulties occurred before, alongside, or after bullying episodes, which could account for emotion dysregulation (Janson & Hazler, 2004). Thus, despite results are promising, longitudinal studies are needed to uncover the mechanisms connecting previous bullying-related experiences to maladjustment in adulthood and to consider numerous variables in several points in time. In addition, studies are encouraged to investigate protective factors too.

Despite these limitations, this study has the merit to broaden our knowledge about the possible long-term consequences of school involvement in bullying, especially indicating that victims and bystanders may develop difficulties in regulating emotions, at least at an implicit level. Whether this

unconscious dysregulation translates into explicit difficulties or becomes observable through physical and psychological distress remains to be investigated. Nevertheless, our findings support the importance of contrasting bullying involvement since an early age in order to limit its negative effects in adulthood.

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References

- Baroncelli, A., & Ciucci, E. (2014). Unique effects of different components of trait emotional intelligence in traditional bullying and cyberbullying. *Journal of Adolescence, 37*, 807–815.
- Camodeca, M., & Coppola, G. (2019). Participant roles in preschool bullying: The impact of emotion regulation, social preference, and quality of the teacher-child relationship. *Social Development, 28*, 3–21.
- Camodeca, M., Goossens, F. A., Meerum Terwogt, M., & Schuengel, C. (2002). Bullying and victimization among school-age children: Stability and links to proactive and reactive aggression. *Social Development, 11*, 332–345.
- Chester, K. L., Spencer, N. H., Whiting, L., & Brooks, F. M. (2017). Association between experiencing relational bullying and adolescent health-related quality of life. *Journal of School Health, 87*, 865–872.
- Davidson, R. J., Putnam, K. M., & Larson, C. L. (2000). Dysfunction in the neural circuitry of emotion regulation: A possible prelude to violence. *Science, 289*, 591–594.
- Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence? *Child Development, 74*, 238–256.
- Derogatis, L. R., & Cleary, P. A. (1977). Confirmation of the dimensional structure of the SCL-90: A study in construct validation. *Journal of Clinical Psychology, 33*, 981–989.
- Esteves, F., Dimberg, U., & Öhman, A. (1994). Automatically elicited fear: Conditioned skin conductance responses to masked facial expressions. *Cognition & Emotion, 8*, 393–413.

- Fekkes, M., Pijpers, F. I. M., Fredriks, A. M., Vogels, T., & Verloove-Vanhorick, S. P. (2006). Do bullied children get ill, or do ill children get bullied? A prospective cohort study on the relationship between bullying and health-related symptoms. *Pediatrics*, *117*, 1568–1574.
- Gini, G., & Pozzoli, T. (2009). Association between bullying and psychosomatic problems: A meta-analysis. *Pediatrics*, *123*, 1059–1065.
- Gross, J. J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology*, *39*, 281–291.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford.
- Herge, W. M., La Greca, A. M., & Chan, S. F. (2016). Adolescent peer victimization and physical health problems. *Journal of Pediatric Psychology*, *41*, 15–27.
- Hessler, D. H., & Katz, L. F. (2007). Children's emotion regulation: Self-report and physiological response to peer provocation. *Developmental Psychology*, *43*, 27–38.
- Hosch, H. M., & Bothwell, R. K. (1990). Arousal, description and identification accuracy of victims and bystanders. *Journal of Social Behavior and Personality*, *5*, 481–488.
- Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences*, *32*, 401–414.
- Janson, G. R., & Hazler, R. J. (2004). Trauma reactions of bystanders and victims to repetitive abuse experiences. *Violence and Victims*, *19*, 239–255.
- Lang, P., & Bradley, M. M. (2007). The International Affective Picture System (IAPS) in the study of emotion and attention. In J. A. Coan & J. J. B. Allen (Eds.), *Handbook of emotion elicitation and assessment* (pp. 29–46). University Press.
- Lovegrove, P. J., Henry, K. L., & Slater, M. D. (2012). Examination of the predictors of latent class typologies of bullying involvement among middle school students. *Journal of School Violence*, *11*, 75–93.
- Lund, R., Nielsen, K. K., Hansen, D. H., Kriegbaum, M., Molbo, D., Due, P., & Christensen, U. (2008). Exposure to bullying at school and depression in adulthood: A study of Danish men born in 1953. *European Journal of Public Health*, *19*, 111–116.
- MacNamara, A., Rabinak, C. A., Kennedy, A. E., Fitzgerald, D. A., Liberzon, I., Stein, M. B., & Phan, K. L. (2016). Emotion regulatory brain function and SSRI treatment in PTSD: Neural correlates and predictors of change. *Neuropsychopharmacology*, *41*, 611–618.
- Mazzone, A., & Camodeca, M. (2018). Emotion awareness and somatic complaints in preadolescence: The mediating role of coping strategies. *Infant and Child Development*, *27*, e2075.
- Mazzone, A., Camodeca, M., Cardone, D., & Merla, A. (2017). Bullying perpetration and victimization in early adolescence: Physiological response to social exclusion. *International Journal of Developmental Science*, *11*, 121–130.

- Meerum Terwogt, M., Rieffe, C., Miers, A. C., Jellesma, F. C., & Tolland, A. (2006). Emotions and self-esteem as indicators of somatic complaints in children. *Infant and Child Development, 15*, 581–592.
- Mikkelsen, E. G., & Einarsen, S. (2002). Relationships between exposure to bullying at work and psychological and psychosomatic health complaints: The role of state negative affectivity and generalized self-efficacy. *Scandinavian Journal of Psychology, 43*, 397–405.
- Morris, J. S., Öhman, A., & Dolan, R. J. (1998). Conscious and unconscious emotional learning in the human amygdala. *Nature, 393*(6684), 467–470.
- Nava, E., & Röder, B. (2011). Adaptation and maladaptation: Insights from brain plasticity. *Progress in Brain Research, 191*, 177–194.
- Olweus, D. (1994). Bullying at school. In L. Huesmann (Ed.), *Aggressive behavior* (pp. 97–130). Springer.
- Paolini, D., Alparone, F. R., Cardone, D., van Beest, I., & Merla, A. (2016). “The face of ostracism”: The impact of the social categorization on the thermal facial responses of the target and the observer. *Acta Psychologica, 163*, 65–73.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717–731.
- Primi, C., Narducci, R., Benedetti, D., Donati, M., & Chiesi, F. (2011). Validity and reliability of the Italian version of the Brief Sensation Seeking Scale (BSSS) and its invariance across age and gender. *Testing, Psychometrics, Methodology in Applied Psychology, 18*, 231–241.
- Rieffe, C., & Camodeca, M. (2016). Empathy in adolescence: Relations with emotion awareness and social roles. *British Journal of Developmental Psychology, 34*, 340–353.
- Rieffe, C., & De Rooij, M. (2012). The longitudinal relationship between emotion awareness and internalising symptoms during late childhood. *European Child & Adolescent Psychiatry, 21*, 349–356.
- Rieffe, C., Meerum Terwogt, M., Bosch, J. D., Kneepkens, C. M. F., Douwes, A. C., & Jellesma, F. C. (2007). Interaction between emotions and somatic complaints in children who did or did not seek medical care. *Cognition and Emotion, 21*, 1630–1646.
- Rivers, I. (2001). Retrospective reports of school bullying: Stability of recall and its implications for research. *British Journal of Developmental Psychology, 19*, 129–142.
- Rivers, I., Poteat, V. P., Noret, N., & Ashurst, N. (2009). Observing bullying at school: The mental health implications of witness status. *School Psychology Quarterly, 24*, 211–223.
- Robertson, T., Daffern, M., & Bucks, R. S. (2012). Emotion regulation and aggression. *Aggression and Violent Behavior, 17*, 72–82.
- Rosen, P. J., Milich, R., & Harris, M. J. (2009). Why’s everybody always picking on me? Social cognition, emotion regulation, and chronic peer victimization in children. In M. J. Harris (Ed.), *Bullying rejection & peer victimization* (pp. 79–100). Springer.

- Sarno, I., Preti, E., Prunas, A., & Madeddu, F. (2011). *SCL-90-R Symptom Checklist-90-R. Adattamento italiano* [Italian adaptation]. Giunti.
- Schäfer, M., Korn, S., Smith, P. K., Hunter, S. C., Mora-Merchán, J. A., Singer, M. M., & Van der Meulen, K. (2004). Lonely in the crowd: Recollections of bullying. *British Journal of Developmental Psychology*, 22, 379–394.
- Sesar, K., Barišić, M., Pandža, M., & Dodaj, A. (2012). The relationship between difficulties in psychological adjustment in young adulthood and exposure to bullying behaviour in childhood and adolescence. *Acta Medica Academica*, 41, 131–144.
- Shields, A., & Cicchetti, D. (2001). Parental maltreatment and emotion dysregulation as risk factors for bullying and victimization in middle childhood. *Journal of Clinical Child Psychology*, 30, 349–363.
- Smithyman, T. F., Fireman, G. D., & Asher, Y. (2014). Long-term psychosocial consequences of peer victimization: From elementary to high school. *School Psychology Quarterly*, 29, 64–76.
- Staubli, S., & Killias, M. (2011). Long-term outcomes of passive bullying during childhood: Suicide attempts, victimization and offending. *European Journal of Criminology*, 8, 377–385.
- Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R. (2011a). Do the victims of school bullies tend to become depressed later in life? A systematic review and meta-analysis of longitudinal studies. *Journal of Aggression, Conflict and Peace Research*, 3, 63–73.
- Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R. (2011b). The predictive efficiency of school bullying versus later offending: A systematic/meta-analytic review of longitudinal studies. *Criminal Behaviour and Mental Health*, 21, 80–89.
- Wesselmann, E. D., Bagg, D., & Williams, K. D. (2009). “I feel your pain.” The effects of observing ostracism on the ostracism detection system. *Journal of Experimental Social Psychology*, 45, 1308–1311.
- Williams, K. D. (2007). Ostracism. *Annual Review of Psychology*, 58, 425–452.
- Wolke, D., Copeland, W. E., Angold, A., & Costello, E. J. (2013). Impact of bullying in childhood on adult health, wealth, crime, and social outcomes. *Psychological Science*, 24, 1958–1970.
- Wolke, D., & Lereya, S. T. (2015). Long-term effects of bullying. *Archives of Disease in Childhood*, 100, 879–885.
- Wolke, D., & Stanford, K. (1999). Bullying in school children. In D. Messer & S. Millar (Eds.), *Developmental psychology* (pp. 341–360). Arnold.
- Wolke, D., Woods, S., Bloomfield, L., & Karstadt, L. (2001). Bullying involvement in primary school and common health problems. *Archives of Disease in Childhood*, 85, 197–201.
- Zuckerman, M., & Aluja, A. (2014). Measures of sensation seeking. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of personality and social psychological constructs* (pp. 352–380). Academic Press.

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