



The relation between cyberbullying and depressive symptoms in adolescence. The moderating role of emotion regulation strategies

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ABSTRACT

This present study investigated the relations between cyberbullying (i.e. cyberaggression and cybervictimisation) and depressive symptoms in a 6 month longitudinal design. The primary aim of the study was to test the relation between cyberbullying and depressive symptoms. Our second aim was to explore the moderating role of emotion regulation strategies in the relation between cyberbullying and depressive symptoms. A sample of 310 adolescents (53.2% girls, $M_{age} = 15.30$, years, $SD = 1.67$) participated in the study, in the Time 1 session and 6 months later in the Time 2 session. The results of a Cross-Lagged analysis showed that depressive symptoms measured at Time 1 were not related to cyberaggression and cybervictimisation at Time 2, while cyberaggression at Time 1 was significantly related to depressive symptoms later at Time 2. Moreover, the results showed that cognitive reappraisal moderated the relations between the two forms of cyberbullying and depressive symptoms. The theoretical and practical implications of these results are discussed.

1. Introduction

Most adolescents use the Internet and smart phones to communicate with each other when it comes to education and entertainment. The use of digital technology has a good number of benefits, like the fact that adolescents can communicate with other people simultaneously, they have easy and quick access to many educational topics and they can establish social connections all over the world (e.g. Ganesini & Brighi, 2015, pp. 1–46; Çetin, Eroglu, Peker, Akbaba, & Pepsay, 2012). Despite all these advantages, there is also the potential for substantial threats coming from computer-mediated communication (Graf, Yanagida, & Spiel, 2019). One of these threats is cyberbullying (i.e., cyberaggression, cybervictimisation), defined as an extension of bullying from school to the virtual medium, through the use of electronic or digital media (e.g. text messaging via mobile phones, social media) (Juvonen & Gross, 2008; Olweus, 2013). Cyberaggression refers to repeated intentional violations and harassment of another person in an electronic context (Kowalski, Giumetti, Schroeder, & Reese, 2012), while cybervictimisation appears as a result of exposure to harmful online messages (Livazović & Ham, 2019).

Adolescents who experience any form of cyberbullying may exhibit feelings of depression, confusion, guilt, fear, shame, stress, anxiety, and

low self-esteem (Patchin & Hinduja, 2012). The psychological and behavioral health problems associated with cyberbullying might be more damaging than those associated with traditional bullying because of the frequency and anonymity of the bullying behaviors allowed by technology (Kowalski, Limber, & McCord, 2018; Wang, Nansel, & Iannotti, 2011). Despite the growing interest in the research of cyberbullying, only a few longitudinal studies have analyzed the relationship between cyberbullying and psychological problems (e.g. Calvete, Orue, & Gámez-Guadix, 2015; Gamez-Guadix, Orue, Smith, & Calvete, 2013). The first aim of the present study is to analyze the relation between cyberbullying (i.e. cyberaggression and cybervictimisation) and depressive symptoms among adolescents during a period of six months. The second aim of this study is to explore whether emotion regulation strategies (i.e. expressive suppression, cognitive reappraisal) play a moderating role in the relation between cyberbullying and depressive symptoms. There were studies which showed that cyberaggressors and cybervictims have difficulties in terms of emotion regulation (Spence, De Young, Toon, & Bond, 2009). Moreover, previous studies documented the associations between emotion regulation strategies and depressive symptoms (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & John, 2003). Therefore, it is possible that the relation between cyberbullying and depressive symptoms may be moderated by emotion

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regulation strategies.

Children in Romania report spending a large amount of time online, having large numbers of online contacts in social networking site (SNS), but present fewer digital skills (e.g., to block messages, to change privacy settings on a social networking profile, to block spam etc.) (Livingstone, Haddon, Görzig, & Ólafsson, 2011; Livingstone, Mascheroni, Ólafsson, & Haddon, 2014; Tsitsika et al., 2012). Fewer developed digital skills and high use of SNS from children and adolescents places Romania among the European countries with the highest rates of cyberbullying (Livingstone et al., 2011; Tsitsika et al., 2015). This evidence highlights the necessity of research conducted among Romanian children and adolescents, in order to understand this phenomenon and to design planned interventions for prevention.

1.1. Cyberbullying and depressive symptoms in adolescence

Depressive symptoms (e.g., sadness, guilty feelings, discouragement about the future) are significant and persistent emotional problems in adolescence (Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017; Yap, Pilkington, Ryan, & Jorm, 2014), being associated with adolescents' poor social and cognitive functioning (e.g., more frequent school absences, lower engagement in classroom activities) (e.g., Suldo, Thalji, & Ferron, 2011).

In recent years, a number of studies have investigated the relation between cyberaggression and depressive symptoms among youth, showing that cyberaggression is positively associated with depressive symptoms (for a review and meta-analysis, see Kowalski, Giumetti, Schroeder, & Lattanner, 2014). In a comparative study, adolescents who cyberbullied others presented higher scores on depression compared to adolescents who had not reported cyberaggression (Campbell, Slee, Spears, Butler, & Kift, 2013). As far as we know, there is no longitudinal study about the relation between cyberaggression and depressive symptoms. There is however evidence from cross-sectional studies that a high level of cybervictimisation is associated with high levels of depressive symptoms in samples of early adolescents (e.g., Chu, Fan, Liu, & Zhou, 2018), adolescents (e.g., Olenik-Shemesh, Heiman, & Eden, 2012; Tsitsika et al., 2015; Wang et al., 2011), older adolescents and young adults (e.g., Jenaro, Flores, & Frías, 2017). Few longitudinal studies offered support for the bidirectional relation between cybervictimisation and depression (Gamez-Guadix et al., 2013) or for the fact that cybervictimisation is an antecedent of depressive symptoms (Calvete et al., 2015; Feinstein, Bhatia, & Davila, 2014; Landoll, La Greca, Lai, Chan, & Herge, 2015).

In order to bring further evidence for the link between both cyberaggression and cybervictimisation and depressive symptoms, the first aim of this research was to test the reciprocal relationships between these variables in a 6 month longitudinal study. When it comes to the relation between cyberaggression and depressive symptoms, there are no previous longitudinal studies to offer some insight about the nature of the relation between these variables in time. However, in accordance with the existing cross-sectional studies (see Kowalski et al., 2014, for a review), we expect to find a positive relation between the two variables. Further, based on previous longitudinal studies (Calvete et al., 2015; Feinstein et al., 2014; Landoll et al., 2015), we expect that cybervictimisation at Time 1 will be positively related with depressive symptoms at Time 2.

1.2. The moderating role of emotion regulation strategies

Emotion regulation is an intrinsic process by which we can determine our emotions and we can control how to experience and how to express emotions (Gross, 2008). In the modal model of emotion, Gross (2008) claims that people use two types of emotion regulation strategies: response-focused strategies, that occur after the emotion is generated (e.g. expressive suppression), and antecedent-focused strategies, that occur before evaluation gives rise to an emotional response (e.g. cognitive

reappraisal). Suppression implies inhibition of emotions, while cognitive reappraisal implies thinking of a situation in a way that decreases its emotional impact (Gross, 2002).

These two emotion regulation strategies present different associations with individuals' cognitive and social functioning (for a review, see Vranjes, Baillien, Vandebosch, Erreygers, & DeWitte, 2017). It is well documented that more use of expressive suppression and less use of cognitive reappraisal is related to higher levels of depressive symptoms (for a review of the literature, see Dryman & Heimberg, 2018; Aldao et al., 2010; Garnefski & Kraaij, 2006; Gross & John, 2003; Joormann & Gotlib, 2010; Larsen et al., 2012). Moreover, the results from a recent systematic review of the literature about the implications of expressive suppression and cognitive reappraisal on depression and anxiety, showed that depression is primarily characterized by the underutilization of cognitive reappraisal, not by expressive suppression (Dryman & Heimberg, 2018).

Previous studies also showed that adolescents cyberaggressors present difficulties in terms of regulating their emotions, namely limited access to emotion regulation strategies and impulse control difficulties (Baroncelli & Ciucci, 2014; Gül, Firat, Sertçelik, Gül, Gürel & Günay Kılıç 2018). Moreover, adolescents are more likely to engage in cyberaggression acts when they use negative emotion regulation strategies, such as blaming others or ruminating about negative experiences (Den Hamer & Konijn, 2016). Cybervictimisation was also related with difficulties in emotion regulation, such as a lack of emotional awareness, limited access to emotion regulation strategies, impulse control difficulties and problems of engaging in goal-directed behaviors (Baroncelli & Ciucci, 2014; Gül et al., 2018). Little evidence has documented the relation between cybervictimisation and expressive suppression and cognitive reappraisal, showing that adolescent cybervictims suppress their emotions more often, while adolescents that were never victims of cyberbullying use cognitive reappraisal more often (Vranjes, Erreygers, Vandebosch, Baillien, & De Witte, 2018).

Vranjes et al. (2017) developed a theoretical model in order to explain emotion regulation strategies in the cyberbullying process in the workplace. The role of emotion regulation in the relation between cyberbullying and subsequent emotional states is also discussed in this model. According to this model, suppression is expected to moderate the relation between cyberaggression and subsequent emotions of anger by boosting these relations. It is also expected to facilitate the relation between cybervictimisation and the emotional states of fear and sadness. Furthermore, cognitive reappraisal is expected to weaken the experience of negative emotions generated by different stressors (e.g. anger, fear, sadness) for both cyberaggressors and cybervictims.

Based on these assumptions, the second aim of the present study is to bring some evidence to support the model by examining the role of emotion regulation strategies (i.e., expressive suppression and cognitive reappraisal) in the relationships between cyberbullying and depressive symptoms among adolescents. As far as we know, no previous study analyzed the moderating role of emotion regulation strategies in the relation between cyberbullying and depressive symptoms in adolescence. Based on the theoretical model developed by Vranjes et al. (2017) and on the results of empirical studies presented above (e.g., Aldao et al., 2010; Dryman & Heimberg, 2018), we anticipate that expressive suppression will exacerbate the relations between cyberaggression and cybervictimisation on the one hand and depressive symptoms on the other, while cognitive reappraisal will decrease the intensity of the relations between both cyberaggression and cybervictimisation and depressive symptoms.

1.3. Individual factors in cyberbullying and depressive symptoms

Numerous individual factors (e.g., gender, age, socio-economic status, technology used, self-esteem, trait anxiety) have been related in previous studies with cyberbullying and depressive symptoms in adolescence (e.g., Adkins, Wang, Dupre, Van den Oord, & Elder, 2009;

Kowalski et al., 2012). Specifically, beginning in early adolescence, girls report higher rates of depressive symptoms compared to boys (e.g. Adkins et al., 2009). Boys are also more involved in cyberaggression, while girls are more often victims of cyberbullying (for a review of the literature, see Zych, Ortega-Ruiz, & Del Rey, 2015). However, there are numerous contradictory results. Firstly, some studies have shown that females engage more in cyberaggression than males and also manifest a higher probability to report cybervictimisation (e.g., Connell, Schell-Busey, Pearce, & Negro, 2014). Secondly, fewer studies have reported that boys are more likely to engage in cyberaggression and also to report cybervictimisation (e.g., Wong, Chan, & Cheng, 2014). Thirdly, Li (2006) found that boys are more likely to be cyberaggressors, but there are no significant differences in cybervictimisation between girls and boys. Finally, other studies claim that there are not significant gender differences in the probability of being a cyberaggressor or a cybervictim (e.g., Smith et al., 2008). Low socio-economic status (SES) is another well-documented risk factor for depression, being related to low available resources and coping strategies (Adkins et al., 2009; Link & Phelan, 1995). SES also tends to be positively related to cyberaggression and cybervictimisation, these relations being explained by the fact that higher SES (e.g., household income) typically involves more frequent access to technology and Internet (for a review of the literature, see Kowalski et al., 2012).

Among the personality factors that may explain the occurrence of depressive symptoms and cyberbullying are self-esteem and trait anxiety. In adolescence, depressive symptoms are related with high trait anxiety (e.g. Muris, Schmidt, Merckelbach, & Schouten, 2001) and low self-esteem (e.g. Fiorilli, Capitello, Barni, Buonomo, & Gentile, 2019). There is also evidence from longitudinal studies of the fact that low levels of self-esteem predict later depression (Masselink, Van Roekel, & Oldehinkel, 2018). Further, positive relations were found between anxiety and the risk of being involved in cyberbullying (as an aggressor or as a victim) among high school adolescents (e.g., Kowalski & Limber, 2013). Other studies have shown that in adolescence a low level of self-esteem is related to a high level of cyberaggression and cybervictimisation (Brewer & Kerslake, 2015; Kowalski & Limber, 2013).

Based on the fact that the above mentioned factors may influence the level of cyberbullying and depressive symptoms, and may also account for the relation between cyberbullying and depressive symptoms, we included them in our model as controlled variables.

2. Method

2.1. Participants and procedure

The participants were recruited from local schools from urban and rural areas in the South-Eastern region of Romania. Five schools were contacted and, after their approval, invitation letters describing the study were sent to the families of the adolescents, in order to obtain permission for their child to voluntarily participate in this study. A sample of 350 participants was involved in the study at Time 1. Without exception, all the participants are Caucasian people, of Romanian ethnicity. Of these participants, 310 were involved in the second measurement occasion, six months later (Time 2) (53.2% girls, $M_{age} = 15.30$, years, $SD = 1.67$, age range: 13–18 years). The level of maternal education was distributed as follows: less than a high school degree (30.96%), a high school degree (40.96%), and a college degree (28.06%). The attrition rate is 11.43% and can be explained by the fact that some participants could not be contacted at the time of the second measurement because they missed the days of testing or they could be contacted but they refused to participate in the second wave.

After signing the informed consent, the participants filled out the questionnaires which measured their trait anxiety, self-esteem, depressive symptoms, cyberbullying, and demographic questionnaire at Time 1. The order of the scales was the order presented above. At time 2, six months later, the participants filled in the same scales again, in the same

order, as well as the scale for measuring the strategies they use to regulate their emotions (i.e., expressive suppression and cognitive reappraisal). Data were collected at the schools during regular school days. Each data collection session took approximately 25 min, in groups of about 20–25 students, where the participants answered the questionnaires all by themselves at the same time in silence. Research assistants collected all the data and the participants had the opportunity to address supplementary questions about the study. The protocol for this study was approved by the Ethical Committee of “Alexandru Ioan Cuza” University and permission for conducting the study was obtained from the participants’ parents as well as from the school authorities. The participation was voluntary and there was no compensation for participating.

2.2. Measures

Cyberbullying. The Romanian version (Boca-Zamfir & Turliuc, 2018) of the *Revised Cyberbullying Inventory for Students* (RCBI, Tanrikulu, 2015) consists of 24 items that measure the nature and severity of cyberbullying experiences over the past three months. The participants indicated the degree to which they agree with each item on the RCBI using a 4 point Likert scale ranging from 1 (none) to 4 (more than three times). There are two similar forms of the scale for the aggressor (e.g. I did it: Insulted someone on a website) and the victim in cyberbullying (e.g. It happened to me: To be insulted by someone on a website), which gives a score for each subscale. The behaviors included in the questionnaire refer to aggressiveness through email, mobile phones, social networks and computer use in general. The total scores were computed by adding up the responses for the two dimensions. High scores indicate severe aggression in relation to another person or victimization. In our sample, the Alpha Cronbach coefficients were .74 (Time 1) and 0.78 (Time 2) for the cyberaggression scale, 0.76 (Time 1) and 0.78 (Time 2) for the cybervictimisation scale respectively. In order to verify the factorial validity of the scale, we used a confirmatory factor analysis (CFA). For the model fit we applied the maximum-likelihood estimation and reported the following fit indexes: Comparative Fit Index (CFI) and the normative fit Index (NFI) and Root Mean Square Error of Approximation (RMSEA). The model fit the data to a satisfactory degree (Hu & Bentler, 1999): $\chi^2(100) = 146.83$, $p = .002$; CFI = 0.97; NFI = 0.92; RMSEA = 0.03, 90% CI: [0.02, 0.05].

Depressive symptoms. The *Beck Depression Inventory* (Beck & Steer, 1984) consists of 21 items that measure depressive symptoms (e.g. sadness, guilty feelings) on a scale of 0 (absence of the symptom) to 3 (severity of the symptom) over a two-week period. The total score was computed by adding up the individual item scores, higher scores indicating more severe depressive symptoms. The Alpha Cronbach coefficients obtained were .82 at T1 and 0.92 at T2.

Emotion Regulation Strategies. The *Emotion Regulation Questionnaire* (ERQ, Gross & John, 2003) validated for the Romanian population by Măirean (2016) was applied at Time 2 to assess individual differences in the use of two emotion regulation strategies: expressive suppression (4 items; e.g. I keep my emotions to myself.) and cognitive reappraisal (6 items; e.g. When I want to feel more positive emotions (such as joy or amusement), I change what I’m thinking about.). The response options for each item range from 1 = “strongly disagree” to 7 = “strongly agree”. For this sample, the Alpha Cronbach coefficients were 0.71 for the expressive suppression scale and 0.76 for the cognitive reappraisal scale. The instrument was previously used on the Romanian population and manifested adequate validity and reliability, and correlations with indicators of stress (e.g. Măirean, 2016).

Trait anxiety. *Spielberger Trait Anxiety Inventory* (STAI, Spielberger, 1983) is a self-reported instrument designed to assess the level of trait anxiety. This scale consists of 20 items that assess how a person generally feels on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). A total score was computed at Time 1, higher scores representing a higher trait anxiety level. The Alpha Cronbach coefficient

was 0.87.

Self-esteem. *Rosenberg Self-Esteem Scale* (Rosenberg, 1965) is a ten item scale with items evaluated on a 5-point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree). Higher scores represent high levels of self-esteem. In this sample, the Alpha Cronbach coefficient was 0.84.

The scales measuring depressive symptoms, self-esteem, and trait anxiety were translated from English into Romanian using the forward-backward translation design (Hambleton, Yu, & Slater, 1999) and the two versions were equivalent regarding the conceptual meaning.

A demographic questionnaire collected data about age, gender, mother's education, ethnicity, and time spent on internet per week (i.e., number of hours), at Time 1.

2.3. Overview of statistical analysis

First, a descriptive statistic was conducted in order to evaluate the frequency of cyberbullying aggression and victimization acts in our sample. Second, the preliminary analyses were conducted to assess gender differences in depressive symptoms, cyberaggression and cybervictimisation. The correlations between age, time spent on internet, depressive symptoms, cyberaggression, and cybervictimisation were also computed, as well as the role of maternal education in depressive symptoms and in the two forms of cyberbullying. Third, for testing the first hypothesis concerning the reciprocal relationships between cyberbullying (i.e., cyberaggression and cybervictimisation) and depressive symptoms, the longitudinal associations among the main study variables were computed using a Cross Lagged design. A cross lagged design is a particular type of structural equation model used to evaluate relations between variables at two different times, in order to identify the effect of one variable on another (Kearney, 2017). The variables related with cyberbullying and depressive symptoms (i.e., gender, age, maternal education, time spent on Internet per week, trait anxiety measured at Time 1, self-esteem measured at Time 1) were entered in the model as controlled variables. Finally, to estimate the moderating role of emotion regulation strategies (Hypothesis 2), we used a structural equation model framework in AMOS Graphics 22 (Arbuckle, 2011). The independent variables were standardized before being entered in the model. The adequate fit between the specified model and the observed data was evaluated using a normed chi-square,

Bentler-Bonett normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) (Hu & Bentler, 1999). In order to interpret the interaction terms, we used (Dawson (2014)) method of graphically displaying the interaction (see Figs. 3 and 4).

3. Results

3.1. The frequency of cyberbullying aggression and victimization acts

The cyberbullying acts most frequently reported by cyberaggressors both at Time 1 and Time 2 were insults on online forums, followed by making embarrassing and insulting comments about online personal information/documents (ex., photos), and spread gossip or rumors online. The acts most frequently experienced by victims were being insulted in online forums, receiving threatening or hurtful comments on the Internet, being involved in gossip or rumors spread online, and receiving embarrassing, insulting comments about online personal information/documents (ex., photos). In most cases, victimization exceed aggression for the cyberbullying acts analyzed in the present study. These data are presented in Fig. 1.

3.2. Preliminary analyses and associations among the main study variables

Descriptive statistics for the main study variables are presented in Table 1. We conducted a preliminary analysis to investigate whether there are significant differences between boys and girls when it comes to cyberbullying and depressive symptoms. The independent sample *t*-tests indicated no significant gender differences in depressive symptoms measured at Time 2, $t(308) = -1.23, p = .218$, but boys present lower levels of depressive symptoms measured at Time 1 ($M = 5.48, SD = 5.57$), compared to the girls ($M = 7.92, SD = 6.67$), $t(308) = -3.49, p = .001$. Further, boys present a higher level of cyberaggression at Time 1 ($M = 19.97, SD = 6.01$) and Time 2 ($M = 20.13, SD = 6.03$), compared to the girls (Time 1: $M = 17.24, SD = 4.77$; Time 2: $M = 18.55, SD = 5.92$), $t(308) = 4.38, p < .001, t(308) = 2.31, p = .021$ respectively. Our results also reveal no significant gender differences in cybervictimisation measured at Time 1, $t(308) = -0.94, p = .346$, but the boys present a lower level of cybervictimisation measured at Time 2 ($M = 19.66, SD$

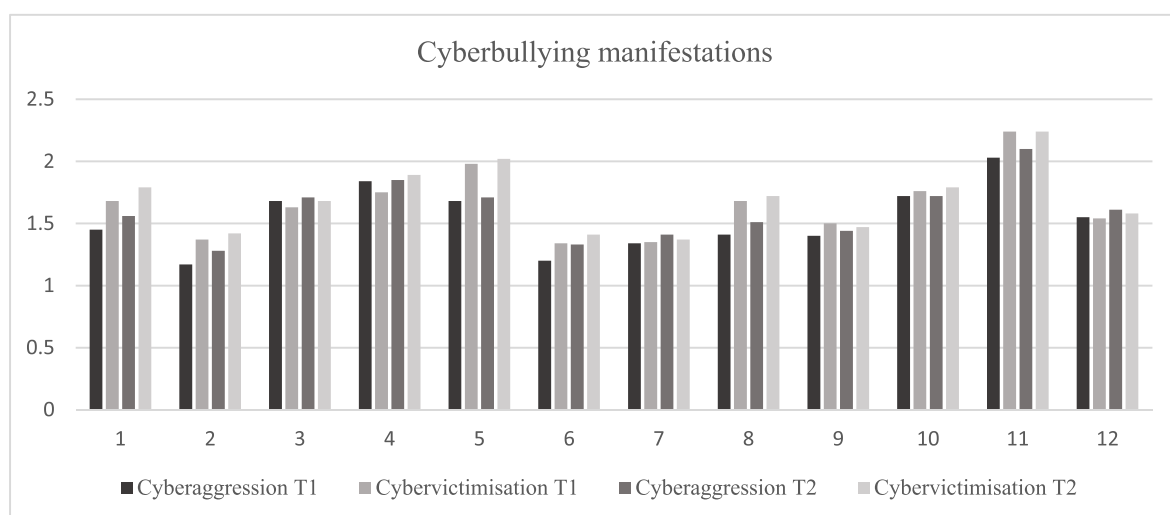


Fig. 1. Frequency of cyberbullying aggression and victimization. 1 = Stealing of personal information from computers or smartphones, 2 = Stealing a person's identity and sharing information online, 3 = Sharing private internet conversations without the other person's knowledge, 4 = Making embarrassing, insulting comments about online personal information/documents (ex., photos), 5 = Sending threatening or hurtful comments on Internet, 6 = Blocking true owner's access to an online account, 7 = Stealing passwords and accessing personal accounts, 8 = Sending threatening, embarrassing or offensive text messages, 9 = Misleading by pretending to be of another gender, 10 = Spreading gossip or rumors online, 11 = Insulting in online forums, 12 = Publishing online an embarrassing photo without a permission.

Table 1

Means, standard deviations, and minimum and maximum values of the main study variables.

Variables	Mean	SD	Minimum	Maximum
1. Cyberaggression Time 1	18.52	5.50	12.00	48.00
2. Cybervictimisation Time 1	19.88	5.93	12.00	38.00
3. Depressive symptoms Time 1	6.78	6.29	0.00	30.00
4. Trait anxiety Time 1	42.00	10.31	22.00	85.00
5. Self-esteem Time 1	36.01	7.59	14.00	50.00
6. Expressive suppression Time 2	16.39	5.25	4.00	28.00
7. Cognitive reappraisal Time 2	28.41	6.97	6.00	42.00
8. Cyberaggression Time 2	19.29	6.01	12.00	41.00
9. Cybervictimisation Time 2	20.44	6.18	12.00	40.00
8. Depressive symptoms Time 2	7.78	8.45	0.00	49.00
9. Trait anxiety Time 2	42.79	10.58	20.00	77.00
10. Self-esteem Time 2	35.18	7.83	10.00	50.00
11. Time spent on Internet	2.72	1.07	0.00	4.00
12. Age	15.30	1.67	13.00	18.00

= 5.95), compared to the girls ($M = 21.12$, $SD = 6.31$), $t(308) = -2.09$, $p = .037$.

Age is not significantly related to any form of cyberbullying (Time 1 and Time 2) or depressive symptoms measured at Time 1 and Time 2 (all $p > .05$). Time spent on the Internet, per week, is positively related to both cyberaggression (Time 1: $r = 0.25$, $p < .001$; Time 2: $r = 0.16$, $p = .003$) and cybervictimisation (Time 1: $r = 0.26$, $p < .001$; Time 2: $r = 0.19$, $p < .001$). However, time spent on Internet, per week, is not related to depressive symptoms at Time 1 ($r = 0.10$, $p = .055$) but present significant relations with depressive symptoms measured at Time 2 ($r = 0.11$, $p = .037$).

Concerning maternal education, the only significant differences were obtained in relation to depressive symptoms at Time 2, $F(2, 307) = 5.98$, $p = .003$. Adolescents whose mothers have a secondary degree ($M = 9.66$, $SD = 8.50$) present higher levels of depressive symptoms compared to adolescents whose mothers have a college degree ($M = 5.42$, $SD = 7.31$).

As expected, depressive symptoms measured at Time 1 are positively correlated with depressive symptoms measured at Time 2 ($r = 0.56$, $p < .001$). Cyberaggression at Time 1 is also significantly related to cyberaggression measured at Time 2 ($r = 0.58$, $p < .001$) and cybervictimisation at Time 1 is significantly related with cybervictimisation at Time 2 ($r = 0.60$, $p < .001$). Further, cyberaggression at Time 1 is significantly related to cybervictimisation measured at Time 1 ($r = 0.47$, $p < .001$) and Time 2 ($r = 0.32$, $p < .001$), while cyberaggression at Time 2 is significantly related to cybervictimisation measured at Time 1 ($r = 0.29$,

$p < .001$) and Time 2 ($r = 0.46$, $p < .001$). Concerning emotion regulation strategies, expressive suppression (Time 2) is positively related to depressive symptoms (Time 2) ($r = 0.24$, $p < .001$), as well as with cybervictimisation (Time 2) ($r = 0.13$, $p = .019$), but it is not significantly related to cyberaggression (Time 2) ($r = 0.08$, $p = .123$). Furthermore, cognitive reappraisal (Time 2) is negatively related to depressive symptoms (Time 2) ($r = -0.25$, $p < .001$) and non-significantly related to cyberaggression ($r = -0.10$, $p = .062$) and cybervictimisation ($r = 0.009$, $p = .870$) at Time 2.

3.3. The relation between cyberbullying and depressive symptoms

To evaluate Hypothesis 1, a Cross-Lagged analysis was conducted, including the adolescents' depressive symptoms and the two forms of cyberbullying, measured at Time 1 and Time 2 (see Fig. 2). The model fit indices indicate a good fit to the data, $\chi^2(52) = 130.36$, $p < .001$; $\chi^2/df = 2.50$; NFI = 0.90, CFI = 0.93; RMSEA = 0.07 CI 95% [0.05; 0.08]. The results show that depressive symptoms measured at Time 1 are not significantly related to cyberaggression at Time 2 ($\beta = 0.01$, $p = .826$) and to cybervictimisation at Time 2 ($\beta = -0.05$, $p = .403$). Also, cyberaggression at Time 1 is significantly related to later depressive symptoms at Time 2 ($\beta = 0.10$, $p = .049$), while cybervictimisation at Time 1 is not significantly related to depressive symptoms at Time 2 ($\beta = -0.05$, $p = .251$).

3.4. Testing the moderation

In order to test our second hypothesis, we used a structural equation model, with cyberbullying (i.e., cyberaggression and cybervictimisation) as independent variables and depressive symptoms as a dependent variable. We also created interaction terms of both cyberaggression (Time 1) and cybervictimisation (Time 1) with expressive suppression (Time 2) and cognitive reappraisal (Time 2). In the path analysis, we controlled for gender, time spent on the Internet, mother's education, trait anxiety (Time 1), self-esteem (Time 1), and depressive symptoms measured at Time 1. The fit indices for the model indicate a good fit: $\chi^2(75) = 155.97$, $p < .001$; $\chi^2/df = 2.08$; CFI = 0.92; RMSEA = 0.05, CI 95% [0.04; 0.07]. The standardized path coefficients are presented in Fig. 3. The model explained 28.6% of the variance in depressive symptoms (Time 2).

Cyberaggression measured at Time 1 is positively related to depressive symptoms at Time 2 ($\beta = 0.10$, $p = .039$), while cybervictimisation was not significantly related with depressive symptoms at Time 2 ($\beta = -0.05$, $p = .283$). Furthermore, expressive suppression

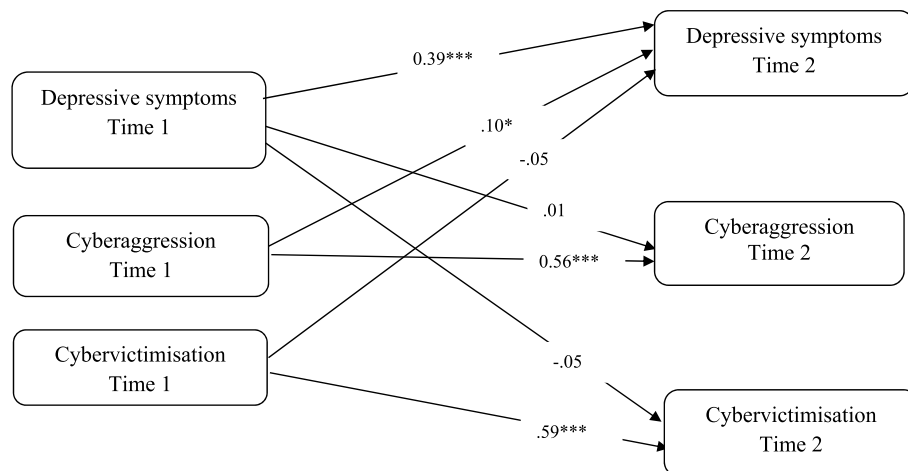


Fig. 2. Longitudinal associations between the adolescents' cyberbullying and depressive symptoms. Standardized coefficients are reported. Gender, age, time spent on Internet, mother's education, trait anxiety (Time 1), self-esteem (Time 1), expressive suppression (Time 2), and cognitive reappraisal (Time 2) were entered in the model as controlled variables. *** $p < .001$.

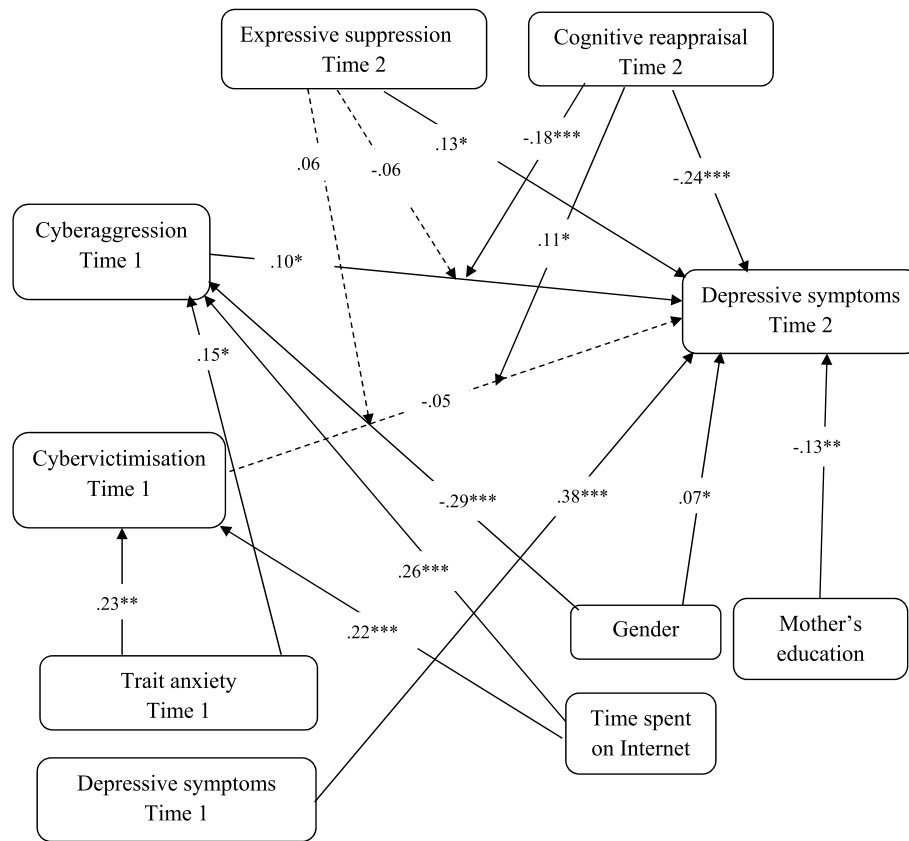


Fig. 3. The structural equation model and path analysis of the relation between cyberbullying and depressive symptoms, moderated by emotion regulation strategies ($N = 310$). Standardized path coefficients are reported. For readability, only significant paths for the relations between controlled variables and the main study variables were represented in the figure. $*p < .05$; $***p < .001$.

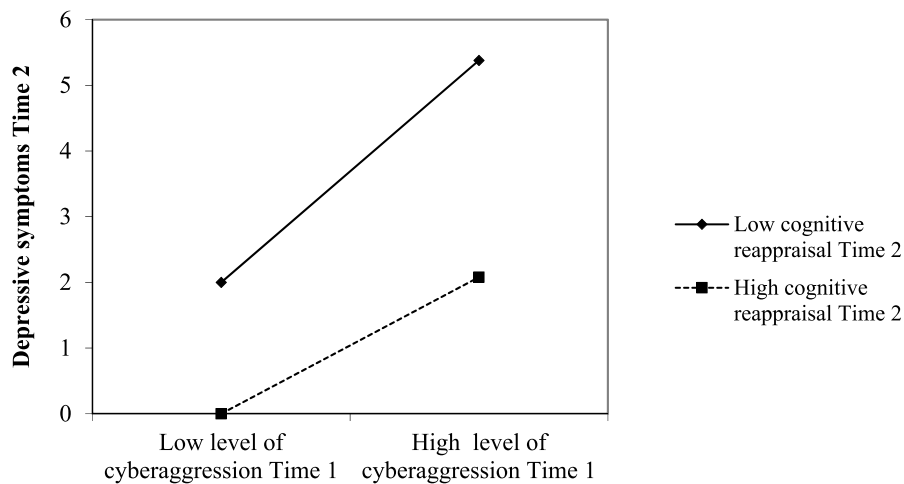


Fig. 4. Depressive symptoms as a function of cyberaggression and cognitive reappraisal.

(Time 2) is positively related to depressive symptoms (Time 2) ($\beta = 0.13$, $p = .012$), while cognitive reappraisal (Time 2) is negatively related to depressive symptoms (Time 2) ($\beta = -0.24$, $p < .001$). Our results also show that cognitive reappraisal moderates the relation between cyberaggression (Time 1) and depressive symptoms (Time 2) ($\beta = -0.18$, $p < .001$). The participants with high levels of cyberaggression (Time 1) reported more depressive symptoms (Time 2) compared to the participants with low levels of cyberaggression (Time 1), when they also present a low tendency to use cognitive reappraisal (Time 2). The simple slope for a low level of cognitive reappraisal (Time 2) is significantly

different from zero (t value of slope = 3.86 , $p < .001$). However, when the level of cognitive reappraisal (Time 2) is high, there are not significant differences in the level of depressive symptoms (Time 2) among the participants with high and with low levels of cyberaggression (Time 1) (t value of slope = -0.57 , $p = .569$). These results are presented in Fig. 4.

The results revealed a significant interaction between cybervictimisation and cognitive reappraisal in relation to depressive symptoms ($\beta = 0.11$, $p = .040$). Thus, when the level of cognitive reappraisal is high, the participants with low level of cybervictimisation present high levels of depressive symptoms compared to the participants with high levels of

cybervictimisation (t value of slope = -2.72 , $p = .007$). When the participants present a high tendency to use cognitive reappraisal, there are not significant differences in their depressive symptoms between those with low and those with high levels of cybervictimisation (t value of slope = 1.16 , $p = .246$) (see Fig. 5).

Expressive suppression did not moderate the relation between cyberaggression (Time 1) and cybervictimisation (Time 1) with depressive symptoms (Time 2).

4. Discussion

This study aimed to identify the relationships between cyberbullying and depressive symptoms among adolescents using a longitudinal design. Moreover, we tested if the emotion regulation strategies (i.e., expressive suppression and cognitive reappraisal) moderate the relationships between cyberbullying and depressive symptoms.

Our preliminary analysis supports one line of research concerning gender differences in cyberaggression and cybervictimisation, consisting of the fact that boys present a higher level of cyberaggression and a lower level of cybervictimisation, compared to the girls (for a review of the literature, see Zych et al., 2015). However, at one-time point (Time 1), we did not find significant gender differences in cybervictimisation, this result being in agreement with some other findings in the literature (Li, 2006). These results suggest that the gender differences in cyberbullying may be moderated by some other personal (e.g., age) or contextual factors (e.g., cultural context, country of origin). A previous meta-analytic review claims that girls were more involved in cyberaggression compared to boys in younger samples (early adolescence), while in older samples (in late adolescence and into college-aged years) boys were more involved in cyberaggression (Barlett & Coyne, 2014). Moreover, it was shown that boys are more involved in cyberaggression in some countries (e.g., United States, Germany, Sweden), while in other geographic zones there were no gender differences in cyberbullying (i.e., Canada, Australia) (Barlett & Coyne, 2014).

Concerning depressive symptoms, the present results claim that boys present lower level of depressive symptoms compared with girls, but only at Time 1. Later, there were no significant differences between boys and girls. Empirical studies claim that girls reported higher rates of depressive symptoms compared to boys beginning in early adolescence (e.g. Adkins et al., 2009). Future studies with different time waves should further evaluate if these differences tend to decrease as adolescents grow up.

Concerning our first objective, the results show that depressive symptoms measured at Time 1 are not significantly related to cyberaggression at Time 2 and cybervictimisation at Time 2. However, cyberaggression at Time 1 is significantly positively related to later depressive symptoms at Time 2. Thus, the present findings expand the previous

literature by bringing support for the longitudinal relation between cyberaggression and depressive symptoms. An explanation for these results could rely on the fact that cyberaggression may be a result of a mixture of more risk factors (e.g. family problems, not living with both parents, difficulties in social relationships; Undheim & Sund, 2010), in comparison with cybervictimisation. Therefore, adolescents who are cyberaggressors toward others may also be victims of other forms of aggression and social rejection, and this accumulation of factors may exacerbate their depressive symptoms. Moreover, in the current study, there is a positive relation between cyberaggression and cybervictimisation, both at Time 1 and at Time 2, and similar results were also reported in previous studies (e.g. Brewer & Kerslake, 2015; Livazović & Ham, 2019; Wong et al., 2014). Thus, the cyberaggressors may be targeted by others to become cybervictims. Further, other studies showed that adolescents who are involved in cyberaggression are also evaluated by their peers as being the most popular students (Thunfors & Cornell, 2008). This fact was interpreted as a need to gain approval in their peer group, in order to mitigate the feeling of low self-worth, which may also be an indicator of depressive symptoms (Bowker, Rubin, Buskirk-Cohen, Rose-Krasnor, & Booth-LaForce, 2010; Undheim & Sund, 2010). The fact that being a cyberaggressor is positively linked to depressive symptoms deserves to be studied in the future in order to investigate the mechanism that links cyberaggression with depressive states. The non-significant relation between cybervictimisation and depressive symptoms may suggest that this relation is moderated by other factors.

Secondly, we tested the moderating role of cognitive reappraisal and expressive suppression in the relationships between cyberbullying and depressive symptoms. In line with previous studies (e.g. Aldao et al., 2010; Joormann & Gotlib, 2010; Larsen et al., 2012), our results show that expressive suppression is positively related to depressive symptoms, and cognitive reappraisal is negatively related to depressive symptoms. Therefore, adolescents who use more suppression tend to be more depressed, while adolescents with a habitual way of reappraising tend to be less depressed. Furthermore, cognitive reappraisal moderated the relations between both cyberaggression and cybervictimisation, and depressive symptoms. Thus, our results highlight the importance of cognitive reappraisal and the fact that a low level of reappraisal can be associated with depressive symptoms when the level of cyberaggression is high (Beck, 2008). The current results expand the previous work (Vranjes et al., 2017) claiming the fact that low cognitive reappraisal moderates the positive relation between cyberaggression and depressive symptoms. Surprisingly, a low cognitive reappraisal may predispose adolescents to depressive symptoms, even when previous circumstances are not favorable to depression (i.e., a low level of cybervictimisation). The positive relation between cybervictimisation and depressive symptoms at Time 1 may partially explain that even a low level of cybervictimisation is related to high depressive symptoms at Time 2,

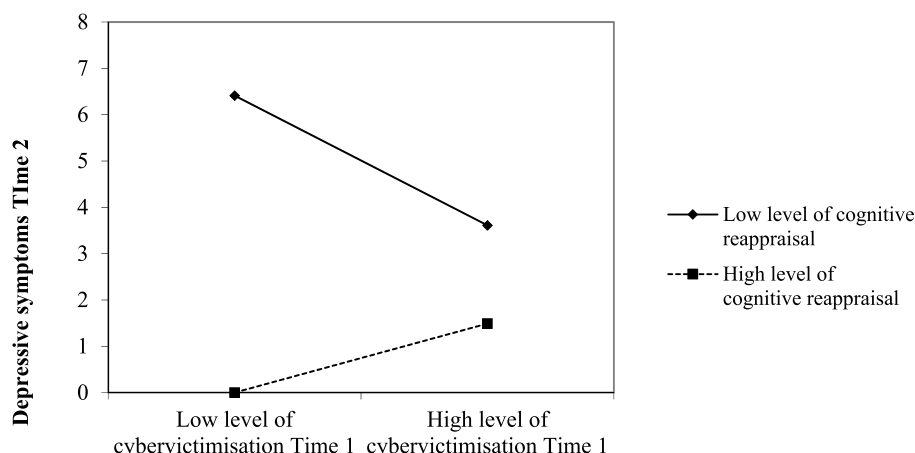


Fig. 5. Depressive symptoms as a function of cybervictimisation and cognitive reappraisal.

particularly when the level of cognitive reappraisal is low. The fact that the participants with high levels of cybervictimisation present lower depressive symptoms when they also report low cognitive reappraisal, suggests that they use other efficient coping strategies to regulate their emotions, or they developed other emotional states, not necessarily depression. For example, previous studies documented the positive relation between cybervictimisation and anger (Lonigro et al., 2015), or between cybervictimisation and state anxiety (Chu et al., 2018). Moreover, difficulty in identifying feelings is a particularity of cybervictims (Aricak & Ozbay, 2016) and may explain our results through the fact that the participants with high levels of cybervictimisation reported lower depressive symptoms because they could not correctly identify their states. Some other factors (e.g. rumination; Feinstein et al., 2014) may mediate the relation between cybervictimisation and the occurrence of depressive symptoms at Time 2. We can conclude that the results partially confirm the assumptions of the theoretical model developed by Vranjes et al. (2017), consisting of the fact that reappraisal moderates the relation between the cyberbullying and emotional states (i.e., depressive symptoms), but more research is needed in order to clarify the nature of the relation between cyberbullying, reappraisal, and depressive symptoms.

Contrary to our expectations, suppression did not moderate the relation between cyberbullying and depressive symptoms, although the results revealed a positive relation between these emotion regulation strategies and depressive symptoms. However, these results are in line with the conclusions of a recent review of the literature that claims that cognitive reappraisal has a more important role in depression compared with expressive suppression, which was found to be the primary characteristic of another emotional disorder (i.e., social anxiety) (Dryman & Heimberg, 2018).

Several limitations of this present study should be noted. First, using self-reporting measures can limit the validity of the results, due to social desirability. Although it is difficult to use other methods to observe such sensitive topics like cyberaggression and cybervictimisation or the inner mechanisms like emotion regulation, future studies can use multiple informants' reports (e.g., peers, friends, teachers or parents) in order to validate the present findings. Secondly, we rely on a longitudinal design with only two time points. Future studies, using more time measurements over a longer time interval, may show the direction of the relation between cyberbullying and depressive symptoms more accurately. The time between the two measures (6 months) may not be optimal to investigate the association between cyberbullying and depression. We used this period because it is a time used in other longitudinal studies (e.g. Gamez-Guadix et al., 2013). Even if the technology is changing very fast, it is important that future research take into account a longer period of time. Thirdly, the relative small sample size and the particularities of our sample (e.g., Caucasian adolescents) prevents the generalization of these results. However, our sample is comparable with the Romanian general population of adolescents in terms of gender and ethnicity, therefore the present results may be extrapolated to Romanian adolescents. Based on the report from the Romanian National Institute of Statistics (2019) concerning the educational system in Romania, 94% of adolescents enrolled in schools represent Romanian ethnic adolescents and 51.8% are girls. Moreover, the demographic characteristics of our sample (e.g., age range, percentage of girls) are comparable with those of large samples selected by random probability procedures, used in European studies that included Romanian adolescents (e.g., Tsitsika et al., 2012).

Despite these limitations, this study has some important theoretical and practical implications. To our knowledge, this is the first study that analyzed the longitudinal relationships between both cyberaggression and cybervictimisation with depressive symptoms, in adolescence. Moreover, we analyzed the role of emotion regulation strategies on the relationships of cyberbullying and psychological problems. The findings contribute to the emerging literature on the subject of cyberbullying, psychological problems and emotion regulation during adolescence, by

illustrating a need to better understand the process of cyberbullying in order to develop intervention programs. In terms of practical implications, the findings of this study can indicate some topics for prevention and intervention programs. Regarding prevention, given the relationships of cyberbullying with depressive symptoms, our results suggest that the objective of prevention programs could be the development of skills to manage depressive symptoms. School psychologists, educators, and parents should realize the importance of providing skill training to diminish depression and encourage healthy peer relationships, in order to prevent the detrimental consequences of cyberbullying, for both the aggressors and the victims. In terms of intervention, providing counseling services for depression or for developing efficient emotion regulation strategies, especially the effective use of cognitive reappraisal (Dryman & Heimberg, 2018), could be important in the treatment of aggressors or victims of cyberbullying. Therefore, in line with other previous studies (e.g. Schoeps, Villanueva Badenes, Prado-Gascó, & Montoya-Castilla, 2018), our results claims that emotional education, centered on developing skills for emotion regulation and decreasing vulnerability for depression, represents an important way to fight against the increase prevalence of cyberaggression and cybervictimisation among adolescents and against the detrimental outcomes associated with this phenomenon.

In conclusion, this study supports the relation between cyberaggression and depressive symptoms. Moreover, it provides preliminary support for the important role that emotion regulation strategies can have in the relationships between cyberbullying and depressive symptoms in adolescence. This could be an important step in the development of prevention and intervention programs for cyberbullying and in exploring their effectiveness in future studies.

Author contributions section

Maria Nicoleta Turliuc was involved in conceiving and designing the study, writing and preparing the manuscript for publication. **Cornelia Măirean** was involved in analyzing the data, writing and preparing the manuscript for publication. **Mioara Boca-Zamfir** was involved in conceiving and designing the study, collecting the data, writing the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2020.106341>.

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