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Wendt, Guilherme Welter; Appel-Silva, Marli; Kovas, Yulia and Bloniewski, Tomasz. 2018. Links Between Cyberbullying, Depression and Self-Esteem in a Sample of Brazilian Adolescents. The European Proceedings of Social & Behavioural Sciences EpSBS, 49(90), pp. 782-793. [Article]

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ICPE 2018
International Conference on Psychology and Education

LINKS BETWEEN CYBERBULLYING, DEPRESSION AND SELF-ESTEEM IN A SAMPLE OF BRAZILIAN ADOLESCENTS

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Abstract

Cyberbullying is considered a serious public health issue, causing concern to students, teachers, parents, and policy makers. Although research on cyberbullying is rapidly growing, most studies to date have come from economically developed countries. This study explores the links between cyberbullying, depression and self-esteem in a sample of Brazilian adolescents (N = 454). Two aspects of cyberbullying are explored: cyber victimization (i.e. being a victim) and cyber aggression (i.e. being a perpetrator). Both cyber aggression and cyber victimisation were positively linked to depression. In addition, cyber aggression was negatively linked to self-esteem. The links between cyberbullying with self-esteem were mediated by depression. The models yielded full mediation effects, in which 97% of the effects of cyber victimization and 86% of the effects of cyber aggression on self-esteem operated via depression. The indirect paths – particularly for cyber aggression – indicate a possible route in which adolescents might suffer the consequences of cyber aggression.

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Keywords: Cyberbullying, depression, self-esteem, mediation analysis.



1. Introduction

Children and adolescents are particularly susceptible to suffering the negative impacts of cyberbullying (Palermi, Servidio, Bartolo, & Costabile, 2017; Smith, Mahdavi, Carvalho, Fisher, Russell, & Tippett, 2008; Sourander et al., 2010). Cyberbullying is defined as repetitive, harmful, and intentional acts performed against victims in digital platforms (e.g. social networking sites, e-mail and instant messaging services) (Smith et al., 2008; Vandebosch & Van Cleemput, 2009). The perpetration of these acts is known as cyber aggression, while being targeted by cyber aggressive behaviours is frequently labelled as cyber victimization (Barlett, 2017; Wendt, 2012). Cyberbullying is a relatively recent phenomenon, with research into its mechanisms and consequences growing rapidly. In July 2018, a search with the medical subject heading (MeSH) of “cyberbullying” returned 5308 results at PubMed Central, with most (4537) articles published in the last decade (2008-2018). None of the previous publications reported data from Brazilian participants.

International research emphasises that exposure to cyberbullying is robustly linked to several internalising and externalising difficulties, such as increased risk for substance use, school dropout, and poly-victimization (i.e. experiences of victimization in two or more contexts, such as at the school and online) (Bonanno & Hymel, 2013; Gámez-Guadix, Orue, Smith, & Calvete, 2013; Olenik-Shemesh, Heiman, & Eden, 2012; Sourander et al., 2010; Tsitsika et al., 2015). With respect to internalising problems, previous work has established associations between cyberbullying and depression and self-esteem (Chang, Chiu, Miao, Chen, Lee, Chiang, & Pan, 2015; Guo, 2016; Patchin & Hinduja, 2010; Wachs, Jiskrova, Vazsonyi, Woflm, & Junger, 2016; Ybarra, Mitchell, Wolak, & Finkelhor, 2006). A recent meta-analysis on risk factors for cyberbullying behaviours revealed that demographic, individual, and contextual factors differentially predict cyber aggression and cyber victimization (Guo, 2016). Being a traditional/offline bully ($r = .39$), having externalizing problems ($r = .31$), having aggressive cognition ($r = .26$), gender (male; $r = .23$), traditional/offline victimization ($r = .21$), and internalizing problems ($r = .19$) were among variables that significantly predicted cyber aggression. On the other hand, significant predictors of cyber victimization included experiencing traditional/offline victimization ($r = .42$), being a traditional/offline bully ($r = .24$), possessing internalizing problems ($r = .28$), low self-esteem ($r = -.14$), gender (female; $r = -.12$), and negative family environment ($r = .12$).

It is important to investigate the links between cyberbullying, low self-esteem and depression – as they are significant risk factors for suicide among youth (Mitchell, Seegan, Roush, Brown, Sustaíta, & Cukrowicz, 2016; Varghese & Pistole, 2017). For self-esteem, research has shown that higher exposure to episodes of cyberbullying (combining the occurrence of being both victims and aggressors) in adolescents was associated with greater consequences for individuals’ self-esteem (Patchin & Hinduja, 2010; Wachs et al., 2016). For example, a correlational investigation conducted with adolescents the United Kingdom ($M_{age} = 17.11$, $SD_{age} = .77$) reported associations of $-.41$ and $-.22$ between self-esteem and cyber victimization and cyber aggression, respectively (Brewer & Kerslake, 2015). In another correlational study with younger participants in Australia (10 to 12 years-old), Muller, Skues, and Wise (2017) reported that an increase in cyber victimization episodes was linked to diminished self-esteem ($F(2, 104) = 4.73$, $p = .011$). Means for self-esteem were 2.26 ($SD = .51$) for those not victimized, 2.47 ($SD = .55$) for participants who reported only one episode of victimization, and 2.02 ($SD = .57$) for participants with

repeated episodes (Muller et al., 2017). A recent cross-sectional investigation conducted with Italian adolescents ($M_{\text{age}} = 15.17$, $SD_{\text{age}} = 2.22$) revealed that cyber victimization was a significant predictor ($\beta = -.13$, $p < .05$) of individual's self-esteem (Palermi et al., 2017).

Cross-sectional and longitudinal data show positive links between depression and cyberbullying. For instance, Low and Espelage (2013) found that higher involvement with cyber aggression was longitudinally associated ($r = .16$) with greater depression among American teenagers ($M_{\text{age}} = 13.09$, $SD_{\text{age}} = 1.05$). A study with Spanish adolescents ($M_{\text{age}} = 15.22$, $SD_{\text{age}} = 1.2$) revealed that cyber victimization at time 1 was associated with depression at both times 1 ($r = .36$) and 2 ($r = .25$) (Gómez-Guadix et al., 2013). A recently published meta-analysis returned a medium effect size for cyber victimization ($r = .20$; $N = 33443$) and for cyber aggression ($r = .25$; $N = 6262$) (Chen, Ho, & Lwin, 2017). One study reported that victims of cyber bullying had higher odds ratio (OR) for depression (OR = 3.26) than those who were victimized exclusively at school (OR = 2.31); in addition, poly-victimization was associated with higher depression (OR = 5.64) (Schneider, O'Donnell, Stueve, & Coulter, 2012). Another correlational study indicated that involvement in cyberbullying (either a victim or a perpetrator) uniquely contributed in predicting depression and suicidal ideation, over and above the role played by traditional (e.g. face-to-face) bullying (Bonanno & Hymel, 2013).

2. Problem Statement

Cyberbullying behaviours in school children present a public health issue, causing concern to students, teachers, parents, and policy makers worldwide (Schneider et al., 2012). Although the research on cyberbullying is rapidly growing, most research to date has come from developed countries, with a need for studies on data coming from developing countries.

3. Research Questions

Following on child abuse research, Wachs et al. (2016) suggested that associations between low self-esteem and higher cyber victimization would exist. Low self-esteem is related with feelings that might partly explain greater vulnerability for being victimized, such as the lack of confidence and sense of being worthless (Rosenberg, 1979). In respect to cyber aggression, one understanding is that those with low levels of self-esteem might prefer technologically-mediated interactions over face-to-face interaction (Joinson, 2004). Higher use of technologically-mediated interactions has been linked with greater involvement of adolescents in aggressive acts online (more cyber aggression), as well as to higher occurrence of cyber victimization (Tsitsika et al., 2015). Previous work suggested that the severity of depression might impact on individual's ability to regulate emotions and to cope with adversities, thus having negative effects on self-esteem (Yang et al., 2013). Based on the international literature on cyberbullying, the following research questions were addressed in the current study: (I) Are cyberbullying behaviours associated with emotional difficulties, such as depression and self-esteem?; (II) Is depression a significant mediator of the links between cyberbullying (cyber victimization and cyber aggression) and self-esteem? We hypothesise that greater self-reported cyberbullying will be associated with greater intensity of depressive symptoms and lower self-esteem. It is predicted that the link between cyberbullying behaviours with self-esteem would be mediated by depression. To the best of our

knowledge, no previous study has tested such a mediation effect in the ‘cyberbullying--self-esteem’ association.

4. Purpose of the Study

The study aims to extend the literature on cyberbullying and its association with emotional problems to Brazilian sample.

5. Research Methods

5.1. Participants, procedures, and design

454 adolescents ($M_{age} = 14.49$, $SD_{age} = 1.40$, 53.5% female) participated in this cross-sectional study. Most participants lived with their parents (89.4%) and 86.6% of participants had siblings ($M = 2.08$, $SD = 1.03$). After receiving ethical approval from the Universidade do Vale do Rio dos Sinos Research Ethics Committee, public and private schools located in the Porto Alegre metropolitan area were invited to take part in the study. With the consent from schools, researchers presented the aims of the study to students, and parental consent forms were collected from those interested in participating. On a second visit, data collection took place from all participants who had a signed consent form from parents/guardians. Students filled in pen and paper questionnaires at the schools, taking 30 minutes on average. Students were assured of the confidentiality of their responses and were instructed about their rights regarding the research in compliance with the Declaration of Helsinki.

5.2. Measures

5.2.1. Revised Cyberbullying Inventory (RCBI; Topcu & Erdur-Baker, 2010; Cronbach’s $\alpha = .85$)

The Brazilian adaptation of this instrument assessed participants’ involvement in different forms of cyberbullying (Wendt, 2012). The inventory is comprised of 28 items. For each item, participants were asked to select the frequency in which they might have been involved with cyber aggression and cyber victimization in the past six months using a 4-point Likert scale ranging from 0 (never) to 3 (more than 3 times). An example item from the victimization subscale is receiving “*Threatening or hurtful comments through e-mail*”, and example from the cyber aggression subscale is “*Insulting in online forums (like chat rooms, Facebook or Twitter)*”. The total possible score is 42 for each subscale (cyber aggression [14 items] and cyber victimization [14 items]), with higher scores indicating greater involvement (Topcu & Erdur-Baker, 2010). A total score is calculated by the sum of the cyber aggression and cyber victimization subscales (total possible score = 84).

5.2.2. Children’s Depression Inventory (Kovacs, 1992; Cronbach’s $\alpha = .82$)

This 27-item measure assesses symptoms related to depression among youth. It has been widely used in previous studies that linked bullying and cyberbullying to internalizing problems (Olenik-Shemesh et al., 2012; Yang et al., 2013). Participants are required to rate every item, with response options ranging from 0 (sometimes) to 2 (very often). An example item is “*I have fun*”. A higher score

indicates a greater severity of depressive symptoms (total possible score = 54). In this study, the Brazilian version was used (Hutz & Giacconi, 2000).

5.2.3. Rosenberg Self-Esteem Scale (Rosenberg, 1979; Cronbach's $\alpha = .72$)

This 10-item scale assesses participants' self-esteem and self-concept, two important constructs that have been previously reported to be compromised among children and adolescents involved with cyberbullying (Patchin & Hinduja 2010). The Rosenberg's scale is arranged on a 4-points Likert scale ranging from 1 (totally disagree) to 4 (totally agree). Again, the version used here was adapted for the Brazilian context by Hutz (2000). An example item is "*I am able to do things as well as most other people*". A higher score indicates a greater self-esteem (total possible score = 40).

5.3. Analytical approach

Means and standard deviations were obtained for all instruments. Mediation analyses were run using regression procedures in IBM SPSS version 22.0 and JASP 0.80 software and the significance of the indirect effect was tested using bias corrected bootstrapping with 5000 samples using the PROCESS macro (version 2.13; Hayes, 2013). Results from regression analyses were entered into MedGraph-I in order to inspect graphical paths of direct and indirect effects (Jose, 2013). Mediation effects were tested for cyber victimization (i.e. being a victim) and cyber aggression (i.e. being a perpetrator). Considering that there are competing procedures for defining models for mediation analyses in cross-sectional research, and that depression and self-esteem might have common aetiological mechanisms (Neiss, Stevenson, Legrand, Iacono, & Sedikides, 2009), this study explored the role of depression as a mediator of the relationships of cyber victimization and cyber aggression with self-esteem; and the role of cyber victimization and cyber aggression as mediators of the relationships between depression and self-esteem (Judd & Seidler, 2008; Roe, 2012).

6. Findings

Cyber victimization and cyber aggression means were 3.98 and 3.84 (SDs = 4.64 and 4.69, respectively). The mean for self-esteem was 29.4 (SD = 5.86) and the mean for depression was 10.03 (SD = 6.48). Variables were normally distributed. Skewness and kurtosis values ranged from -0.79 to 1.66 , and from 2.60 to 3.05 , respectively. The Breusch-Pagan test (BP) indicated no problems in respect to heteroscedasticity ($BP(3) = 1.01, p = .80$), and the Harvey-Collier's test indicated linearity for the relationship between study's variables ($HC(406) = .94, p = .34$) (Hair, Black, Babin, & Anderson, 2010). Table 1 presents associations between cyberbullying behaviours and internalising symptoms (depression and self-esteem).

Table 01. Associations between cyberbullying behaviours, depression, and self-esteem

		1 SE	2 Depr	3 CVict	4 CAggr	5 CB tot
1 Self-esteem	Pearson's <i>r</i>	—	-.346	-.088	-.094	-.099
	<i>p</i> -value	—	< .001	.063	.046	.036
	Upper 95% CI	—	-.259	.005	-.002	-.007
	Lower 95% CI	—	-.428	-.179	-.185	-.190
2 Depression	Pearson's <i>r</i>		—	.239	.232	.258
	<i>p</i> -value		—	< .001	< .001	< .001
	Upper 95% CI		—	.328	.321	.346
	Lower 95% CI		—	.146	.139	.166
3 Cyber victimization	Pearson's <i>r</i>			—	.662	.908
	<i>p</i> -value			—	< .001	< .001
	Upper 95% CI			—	.711	.923
	Lower 95% CI			—	.607	.890
4 Cyber aggression	Pearson's <i>r</i>				—	.914
	<i>p</i> -value				—	< .001
	Upper 95% CI				—	.928
	Lower 95% CI				—	.898
5 Cyberbullying total	Pearson's <i>r</i>					—

Note. SE = Self-esteem; Depr = Depression; CVict = Cyber victimization; CAggr = Cyber aggression; CB tot = Cyberbullying total. Significant correlations in bold.

Mediation analyses

The first assumption to be checked for mediation is that the mediator variable (depression) should predict the dependent variable (DV; self-esteem), and results supported this requirement ($R^2 = .12$, $\beta = -.31$, $p < .001$). In addition, the independent variables (IVs; cyber victimization and cyber aggression) should likewise predict the mediator (second assumption; Baron & Kenny, 1986; Rucker, Preacher, Tormala, & Petty, 2011). Hence, results were significant for cyber victimization ($R^2 = 5.5\%$, $\beta = .239$, $p < .001$) and for cyber aggression ($R^2 = 5.2\%$, $\beta = .232$, $p < .001$). Additionally, another requirement states that when IVs and the mediator are included together in the regression, the relationship between IVs and DV reduces and the variance explained increases. This condition was also supported. For cyber victimization, beta's value decreased to .009 and R^2 increased to 12.3%, with .97 indirect to total ratio (Sobel's $z = -4$, $p = .003$). The 95% Confidence Intervals (CIs) of the bias corrected bootstrap with 5000 samples was again below zero, ranging from -.13 to -.03. For cyber aggression, beta's value decreased to .002 and R^2 increased to 12.4%, with .86 indirect to total ratio (Sobel's $z = -4$, $p = .004$). A bias corrected bootstrap with 5000 samples indicated that the indirect effect through the mediator was significant and below zero (95% CIs: from -.12 to -.03).

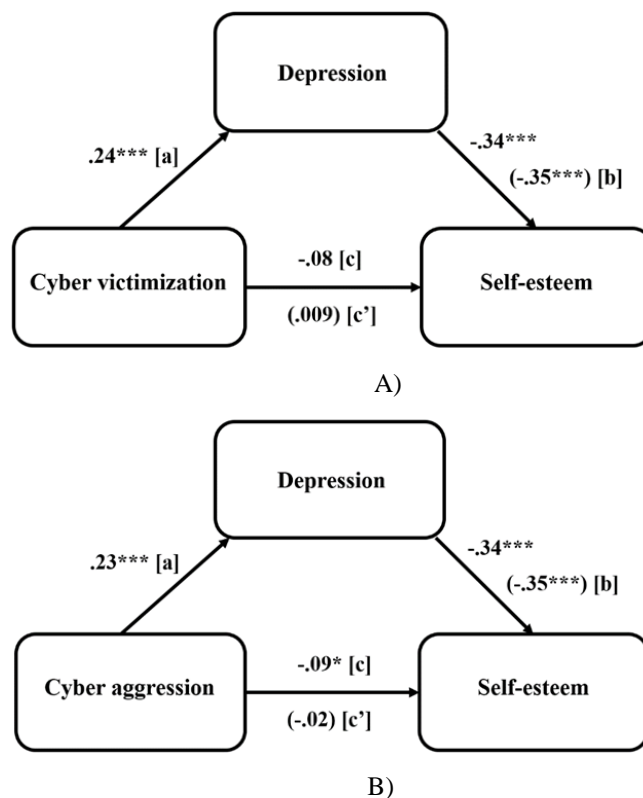


Figure 01. Depression mediates the relationship between self-esteem and cyber victimization (A) and between self-esteem and cyber aggression (B) in adolescents. *Note:* *** $p < .001$; * $p < .05$. Values in parentheses are β 's taken from the regression analyses, and the remainder values are zero-order correlations between variables. Paths c and c' in the model correspond to total and direct effects, respectively.

Considering that depression and self-esteem might have common aetiological mechanisms (Neiss et al., 2009; Neiss, Stevenson, Sedikides, Kumashiro, Finkel, & Rusbult, 2005), subsequent analyses were conducted in which cyber victimization and cyber aggression were set as IV, depression as DV, and self-esteem as a mediator. The second assumption for mediation was not met for this model as the IVs did not predict the mediator (Baron & Kenny, 1986). Additionally, both cyber victimization and cyber aggression were set as mediators on the relationships between depression and self-esteem. Although these two models appear to satisfy the conditions for mediation (Baron & Kenny, 1986), the 95% CI of the bias corrected bootstrap with 5000 samples included zero, which indicates that mediation did not occur (95% CIs: -.01 to .02 and -.02 to .01 for the models taken cyber victimization and cyber aggression as mediators, respectively).

7. Conclusion

The current investigation explored the links between cyberbullying behaviours and self-esteem and depression, comparing the means of these variables to previous studies conducted with adolescents in Brazil and worldwide. Additionally, the study explored a possible mediation effect of depression in the associations between cyber victimization and self-esteem, and between cyber aggression and self-esteem. Means for depression (10.3) were below the international cut-off scores (i.e. 17; Kovacs, 1992) and were similar to previous report from Brazilian adolescents (i.e. 10.1; Reppold, 2001). Self-esteem (29.9) was

also within the international range (i.e. 27; Brewer & Kerslake, 2015), although below the levels reported previously in Brazil (i.e. 34.7; Reppold, 2001). Compared to Brewer and Kerslake's (2015) study - which used the RCBI to assess cyberbullying among British adolescents - means detected in the current investigation for cyber aggression (3.84) and cyber victimization (3.98) were below the reported values of 5.55 (cyber aggression) and 7.78 (cyber victimization). One potential reason for these differences might include less awareness of what constitutes cyberbullying for Brazilian adolescents. Indeed, there are strong campaigns in developed countries alerting children, adolescents, parents and teachers about cyberbullying and its consequences (Wendt, 2012). Another tentative explanation could be associated to differential use of technology by adolescents from various sociocultural backgrounds (Li, 2008).

In line with several investigations, correlational analyses revealed that increased involvement with cyber aggression and cyber victimization was associated with greater depressive symptoms (cf. Chen et al.'s (2017) meta-analysis). However, this association was very weak. Self-esteem was also weakly associated with cyber aggression behaviours, but its association with cyber victimization did not reach statistical significance. A similar pattern was noted in a study with college students in the US, which showed a negative impact on self-esteem only for cyber aggressors (Varghese & Pistole, 2017). Studies with samples with age comparable to our investigation yielded contradictory results (i.e. indicating deficits in self-esteem only amongst those victimized by cyberbullying; Guo, 2016; Palermi et al., 2017), which might be indicative of other variables playing mediating and/or moderating roles on the association of different forms of cyberbullying with self-esteem. Both Palermi et al. (2017) and Muller et al. (2017) did not provide correlations between cyber victimization and self-esteem, nor investigated cyber aggression behaviours, therefore comparison is not possible. One of the first investigations exploring together the role of cyber victimization and cyber aggression on adolescent's self-esteem also did not report coefficient of correlations (Patchin & Hinduja, 2010). However, Brewer and Kerslake (2015) reported a moderate, negative association between self-esteem and cyber victimization; and a weak negative correlation between self-esteem and cyber aggression. Taken together, the associations detected in this study between depression, self-esteem, cyber aggression and cyber victimization seem to confirm past research.

The present study found a moderate, positive association between cyber aggression and cyber victimization ($r = .66$). As seen in past research, both forms of cyberbullying can be highly correlated (e.g. $r = .80$; Brewer & Kerslake, 2015). In comparison to data collected in the United Kingdom, there were differences in the strength of correlations between the two forms of cyberbullying, and also between cyber aggression and cyber-victimization with self-esteem. Stronger associations were noted among British adolescents, which could reflect cultural differences. Another explanation for these differences might refer to methodological procedures. For example, the current study collected data using pen and paper, while Brewer and Kerslake (2015) used electronic procedures for data collection.

The results of the mediation analysis suggest that the relationships between cyberbullying with self-esteem were mediated by depressive symptoms. The tested models yielded full mediation effects, in which 86% of the effects of cyber aggression and 97% of the effects of cyber victimization on self-esteem go through depression. These values were obtained by dividing the indirect effects by the total effects, and greater values (i.e. close to 100) represent bigger effect sizes (José, 2013). The link detected between

cyber aggression and self-esteem becomes non-significant when depression is included as a mediator, suggesting indirect routes through which cyber aggression is linked to adolescents' self-esteem. Guo (2016) reported that self-esteem was an important predictor of cyber victimization. The current investigation showed that an important mediator of this path is played by depression, hypothesising that individuals who might apparently not present with deficiencies in self-esteem due to involvement with cyber victimization could show indirect paths that will eventually impact on their levels of self-esteem.

At the moment, it is not possible to compare these findings to available data in Brazil, but similar mediation role of depression was observed in studies in North America that have explored cyberbullying as predictor of suicidal ideation (Mitchell et al., 2016) and attempts of suicide (Sampasa-Kanyinga, Roumeliotis, & Xu, 2014). In this last investigation, depression fully mediated the links between cyber victimization and suicide attempts. One possible reason for a lack of investigations in respect to the role of depression as a mediator of the links between self-esteem and other variables might be due to the fact that both depression and self-esteem are aetiologically related (Neiss et al., 2009) Hence, our findings build upon and extend past examinations of correlates of different forms of cyberbullying.

The present study has several limitations. First, there are multiple ways of defining the relationships for mediation analyses in cross-sectional research, which impedes clarification of casual mechanisms (Hayes, 2013; Lemmer & Gollwitzer, 2017; MacKinnon, Lockwood, & Williams, 2004; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Pieters, 2017). Second, the recruitment of participants did not follow probabilistic procedures, which could have implications in terms of generalisability to different regions in Brazil. Third, the sample was composed of adolescents, so further research needs to extend to different populations (e.g. young adults or children).

Despite limitations, the study generated new insights into the links between cyber bullying and emotional responses, extending previous research to Brazil. The results of the present study are suggestive of complex cascade effects of cyber bullying on the psychological wellbeing of adolescents. Longitudinal research is needed in order to explore the causal associations that are likely to be reciprocal and unravelling overtime (Wendt, 2012). Further work should also explore additional important covariates of cyberbullying – such as internet use, parental involvement, and personality traits, as well as socio-demographic factors. Previous research found that school characteristics and exposure to community violence may increase the risk for the manifestation of many forms of aggressive behaviours (Cassidy, Faucher, & Jackson, 2013; Grossi & dos Santos, 2009), but the extent to which these variables impact on adolescents' engagement with cyberbullying in Brazil is less clear. In addition, future research is needed to establish more diverse instruments for assessing cyberbullying. Better understanding of the pathways through which cyber-bullying emerges and affects psychological wellbeing will help educational practitioners to promote optimal development in adolescents (Gámez-Guadix et al., 2013; Mitchell et al., 2016; Smith et al., 2008; Varghese & Pistole, 2017).

Acknowledgments

This study received support from the International Society for the Study of Behavioural Development (ISSBD) - Developing Country Fellowships for G. W. Wendt (2012-2014), and from Capes Foundation (Brazil) – Master's course scholarship.

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