Are Perceived Executive Functions Beneficial for Adolescents Who Experience Peer Victimization?

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Abstract

Peer victimization can lead to dysfunctional cognitions and numerous internalizing psychological problems. Thus, it is essential to identify factors that can moderate the impact of victimization. This study aimed to analyze the potential moderating role of perceived executive functions (PEF) in the impact of peer victimization (traditional and online) on internalizing symptoms (depression and social anxiety), early maladaptive schemas (disconnection/rejection domain), and PEF in adolescents. A two-wave longitudinal study was carried out with 680 Spanish adolescents between 12 and 17 years of age ($M = 14.58$, $SD = 1.36$; 41.18% girls). Participants completed measures of self-reported executive functions, traditional and online victimization, early maladaptive schemas of the disconnection/rejection domain, depressive symptoms, and social anxiety symptoms in waves 1 and 2. Traditional and online perpetration was completed only in wave 1. The results indicated that when PEF were high (i.e., adolescents perceive that they have good executive functions), traditional and online victimization predicted more schemas of the disconnection/rejection domain and internalizing symptoms of depression and social anxiety. In non-victims, high PEF showed a protective role in the development of depressive symptoms and schemas of the disconnection/rejection domain. The findings highlight that PEF have a protective role that disappears when victimization (traditional and online) occurs.

Victimization by peers is a severe problem that occurs in adolescence and can arise in face-to-face/traditional situations (Smith, 2016) as well as online (Patchin & Hinduja, 2015). When the acts of victimization by peers are repetitive and the victim is in a position of inferiority, the labels bullying/cyberbullying victimization are used (Chun et al., 2020; Olweus, 2013; Smith, 2016). A recent study involving 6,202 adolescents found prevalence rates for traditional and online victimization of 33% and 17%, respectively (Eyuboglu et al., 2021). In a study of 2,083 Spanish adolescents, 25.1% of them reported suffering from traditional victimization once or twice a month, and 9.4% reported experiencing online victimization once or twice a month (Pichel et al., 2021). Victimization by peers has been associated with several psychological problems (for meta-analyses, see Kowalski et al., 2014; Moore et al., 2017). Depression is a frequent problem among victims. For instance, longitudinal research concluded that both victimization by traditional (Alba et al., 2018; Calvete et al., 2016b; Sigurdson et al., 2015) and online aggression (Gámez-Guadix et al., 2013; Kowalski et al., 2014; Landoll et al., 2015) predicted an increase in depressive symptoms in adolescents. Traditional victimization (Calvete et al., 2016b, 2018; Landoll et al., 2015) and online victimization (Coelho et al., 2022) also predicted social anxiety symptoms.

In addition, peer victimization may lead to the development of dysfunctional cognitions in the victims (Gibb et al., 2012), which in turn contribute to a worsening of depressive and social anxiety symptoms (Alba et al., 2018; Calvete, 2014). Early maladaptive schemas (EMSs) are an important type of dysfunctional cognition. They are the key constructs of schema therapy and are conceptualized as broad, dysfunctional, and pervasive patterns, concerning memories, emotions, cognitions, and bodily sensations about oneself

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and one's relationships with others (Young et al., 2003). The schema therapy model proposes that there are 18 schemas related to the basic needs of the child that were not satisfied in childhood or adolescence. These schemas are grouped into five categories called "schema domains". Previous research suggested that one of the schema domains most closely linked to victimization is the disconnection/rejection domain (Calvete, 2014; Calvete et al., 2016a). This domain refers to the belief that one's needs for security, stability, nurturance, empathy, acceptance, and respect will not be consistently fulfilled. The EMSs of the disconnection/rejection domain are abandonment/instability, mistrust/abuse, emotional deprivation, defectiveness/shame, and social isolation/alienation (Young et al., 2003).

The experiences of peer victimization can contribute to the development of beliefs that one will be abused by others and that one is defective or inferior, changing how adolescents perceive themselves and their environment (Young et al., 2003). This idea is supported by a recent meta-analysis that concluded that EMSs were associated with interpersonal problems (Janovsky et al., 2020). Specifically, some studies indicated that traditional victimization predicted a worsening of several schema domains in adolescents, including the disconnection/rejection domain (Calvete, 2014; Calvete et al., 2018). In the case of online victimization and EMSs, the scarce longitudinal evidence has shown that online victimization can predict higher scores on schemas of the disconnection/rejection domain (Calvete et al., 2016a). Cross-sectional studies also supported the relationship between online victimization and the disconnection/rejection domain (Faura-Garcia et al., 2021; Mallmann et al., 2017). The impact of peer victimization on the worsening of these patterns is concerning because it can contribute to the development of numerous psychological problems. For example, the disconnection/rejection domain was also related longitudinally with symptoms of depression (Alba et al., 2018; Calvete et al., 2015, 2019a, b; Gómez-Odriozola & Calvete, 2020) and social anxiety (Calvete et al., 2015, 2018) in adolescents. For a systematic review of EMSs and mental health, see Nicol et al. (2020).

The Role of Perceived Executive Functions in the Reactions to Traditional and Online Victimization

The findings mentioned above indicate that it is necessary to identify protective factors that can buffer the impact of victimization on internalizing symptoms and dysfunctional cognitions. One such mechanism could be executive functions. Executive functions are conceptualized as a group of interrelated and top-down psychological processes needed to make complex decisions and resolve novel situations successfully,

when "going on autopilot" or relying on intuition would be imprudent, insufficient, or impossible (Diamond & Ling, 2019). When a new and complex task demands the use of executive functions, various components of executive functions (e.g., planning, inhibition, updating) are activated and work together to achieve the proposed goal. Deficits in executive functions have been proposed as a risk factor for psychopathology, including depression and anxiety (Hankin et al., 2016; Snyder et al., 2015).

Executive functions can be assessed using a variety of approaches, including performance/neuropsychological tasks and self-report questionnaires (Portellano & García, 2014). In the case of self-report questionnaires about executive functions, they measure subjective experiences of executive problems (e.g., problems of attention, concentration, and impulsiveness in day-to-day life) from the individual perspective (Buchanan et al., 2010) and therefore the individual's perceived executive functions. Recently, perceived deficits in executive functions have been the focus of considerable research. Some argued that their advantages include greater ecological validity in examining behavior in complex real-world situations (e.g., distractions when performing a particular task) and representative impairments in daily life, as they are not limited to a specific moment in a structured laboratory condition (Barkley & Fischer, 2011; Snyder et al., 2021). Self-report questionnaires are also convenient to administer (Buchanan et al., 2010), as they are simple and require few human resources.

Previous research has examined the associations between perceived executive functions (PEF) and psychological problems. Perceived deficits in executive functions were related to depressive symptoms and anxiety symptoms in adolescents (Mullin et al., 2020; Wante et al., 2017). Concerning social anxiety symptoms, to the best of our knowledge, there are no studies on PEF in adolescents, and studies on adults are also scarce (Fujii et al., 2013); although there is evidence that executive functions assessed by self-report questionnaires are impaired in adults with social phobia (Demetriou et al., 2018). In fact, self-reported executive functions were more strongly associated with psychological problems than performance/neuropsychological tasks (Dickson et al., 2017).

Regarding the association between PEF and EMSs, adolescents with a poor perception of their executive functions (i.e., with experiences of concentration problems, performance test errors, etc.) are more likely to have a more negative view of themselves, including some negative elements that are characteristics of the disconnection/rejection schema domain (e.g., perceptions of defectiveness). However, while the relationship between executive functions and cognitive vulnerabilities such as rumination has been examined (Dickson et al., 2017), there is a gap in relation to EMSs in adolescents. In a cross-sectional study, deficits

in executive functions were associated with EMSs in young adults (Figueredo et al., 2018). In other studies with adults, schemas of the disconnection/rejection domain were related to attention deficit hyperactivity disorder symptoms (Kiraz & Sertçelik, 2021; Philipsen et al., 2017), which is strongly associated with perceived deficits in executive functions (Krieger & Amador-Campos, 2018).

Although a few studies have found that there are positive associations between deficits in executive functions and both traditional (Ji et al., 2018; Wang & Zhou, 2019) and online victimization (Abdelrazek & Eltantawy, 2020; Heiman et al., 2015), to date, no studies have examined the role of PEF in the reactions to peer victimization. This role could be complex. On the one hand, the findings mentioned above suggest that high PEF could act as a resilience factor when adolescents experience peer victimization. A positive self-perception of executive functions is closely linked to resilience (Wu et al., 2021) and dispositional mindfulness (Shin et al., 2016), and both resilience (Santos et al., 2021) and dispositional mindfulness (Faura-Garcia et al., 2021) buffers the association between online victimization and depressive symptoms in adolescents. On the other hand, victimization could damage executive functions (Holmes et al., 2016). Being a victim can lead to deep changes in adolescents' belief systems (Calvete et al., 2016a). Thus, victimization could negatively influence the self-perception of executive functions. As indirect evidence of this mechanism, a recent cross-sectional study concluded that self-reported cognitive flexibility mediated the association between peer victimization and social anxiety symptoms in adolescents (Liu et al., 2022).

Current Study

The main aim was to examine the potential moderating role of PEF in the impact of traditional and online peer victimization on internalizing symptoms of depression and social anxiety, the disconnection/rejection schemas, and PEF in adolescents. It was hypothesized that PEF would attenuate the predictive association between victimization (traditional and online) and the development of internalizing symptoms, the disconnection/rejection domain, and PEF. As victimization can potentially deteriorate the perception of executive functions, we examined this mechanism as well.

To understand these relationships, two different predictive models were developed: one for traditional victimization and another for online victimization. Including a model for traditional victimization and another for online victimization can be enriching since they provide two different perspectives of victimization. Specifically, traditional victimization involves aggressive behavior designed to hurt another that is carried out face-to-face (Smith, 2016), while online victimization occurs in the digital context through computers, cell phones, and other electronic devices (Patchin & Hinduja, 2015). As there is high reciprocity between victimization and perpetration of aggressive behaviors in children and adolescents (for meta-analyses of longitudinal studies, see Marciano et al., 2020; Walters, 2021) and perpetration of aggressive behavior has been associated with executive functions (e.g., Abdelrazek & Eltantawy, 2020; Potard et al., 2021), it was included in both models to control its role and estimate the unique associations between victimization and the other study variables.

Methods

Participants

The study sample consisted of 680 adolescents (280 girls and 400 boys) between 12 and 17 years of age ($M = 14.58$, $SD = 1.36$) from five high schools, three private and two public, from the Basque Country (Spain). The adolescents completed at least one of the two waves of the study, comprising a period of 5–6 months. Of the total sample, 8.2% did not take part in Wave 1 (W1), and 13.1% did not take part in Wave 2 (W2). Attrition was due to not attending class on the days of measurement. Table 1 shows the socioeconomic status of the sample. The Spanish Society of Epidemiology and Family and Community Medicine (2000) criteria were followed

Table 1 Socioeconomic Status of the Sample

	Sex				Age				Full sample ($N = 680$)	
	Girls ($n = 280$)		Boys ($n = 400$)		12–14 ($n = 386$)		15–17 ($n = 294$)			
	n	%	n	%	n	%	n	%	n	%
Low	34	12.1	51	12.8	71	18.4	14	4.8	85	12.5
Low-Medium	35	12.5	45	11.3	55	14.2	25	8.5	80	11.8
Medium	76	27.1	105	26.3	114	29.5	67	22.8	181	26.6
High-Medium	67	23.9	80	20	63	16.3	84	28.6	147	21.6
High	42	15	88	22	38	9.8	92	31.3	130	19.1
No information	26	9.3	31	7.8	45	11.7	12	4.1	57	8.4

for the socioeconomic status distribution. Table 1 shows that 12.5% of the adolescents had a low socioeconomic status, while 11.8% had a low-medium, 26.6% had a medium, 21.6% had a high-medium, and 19.1% had a high socioeconomic status. Of the adolescents, 8.4% did not provide socioeconomic status information. In the distribution by sex, both girls and boys mostly have a medium–high-medium socioeconomic status. Regarding age, the distribution is very different. In younger adolescents (12–14 years), a medium socioeconomic status is predominant (29.5%), while in older adolescents (15–17 years) a high socioeconomic status is most common (31.3%).

Measures

Perceived executive functions –also called PEF– were evaluated with the Webexec questionnaire (Buchanan et al., 2010). Webexec is a self-report questionnaire that assesses the global perception of possible problems in executive functions. This questionnaire has six items and is rated on a four-point scale, ranging from 1 (*no problems experienced*) to 4 (*a great many problems experienced*). The higher the score, the higher the problems perceived in executive functions. An example item is "Do you have difficulty carrying out more than one task at a time?" However, in this study recoded Webexec questionnaire's scores were employed, that is, the higher the score, the better the PEF. The Spanish version of the Webexec indicated the evaluation of a single component and good internal consistency reliability, with an ordinal's α coefficient of 0.85 (Morea & Calvete, 2020). In the present study, Cronbach's α coefficients were 0.80 at W1 and 0.78 at W2.

Traditional aggressive behavior was measured with the revised version of the Peer Experiences Questionnaire (RPEQ; Prinstein et al., 2001). The RPEQ is composed of nine items for the assessment of traditional victimization (e.g., "A classmate chased me like he or she was really trying to hurt me") and nine for assessing traditional perpetration (e.g., "I hit, kicked, or pushed a classmate in a mean way") in the last 6 months. The RPEQ includes two types of aggressive behavior (overt and relational) and is rated on a five-point scale, ranging from 1 (*never*) to 5 (*a few times a week*). Higher scores are related to higher traditional aggressive behavior. The Spanish version of this questionnaire showed adequate internal consistency for both subscales (Calvete et al., 2019a, b). Cronbach's α coefficients in this study were 0.85 for W1 and 0.76 for W2 traditional victimization subscale and 0.81 for the traditional perpetration subscale.

Online aggressive behavior was assessed with the Cyberbullying Questionnaire (CBQ; Calvete et al., 2010; Gámez-Guadix et al., 2014). The CBQ has nine items for evaluating online victimization (e.g., "Broadcasting online secrets, compromising information, or images about me") and nine for evaluating online perpetration (e.g., "Writing embarrassing jokes, rumors, gossip, or comments about a classmate on the Internet") during the last 6 months. This questionnaire is rated on a four-point scale, from 0 (*never*) to 3 (*5 or more times*). The higher the score, the higher the online aggressive behavior. The CBQ showed good internal consistency and adequate convergent and factorial validity (Calvete et al., 2010; Gámez-Guadix et al., 2014). In this study, the CBQ displayed non-normal distributions for both subscales. Therefore, ordinal α values were calculated for both subscales using the Excel document developed by Domínguez (2012). The ordinal's α coefficients were 0.90 for W1 and 0.91 for W2 online victimization subscale and 0.88 for the online perpetration subscale.

Disconnection/rejection schemas were evaluated with the Young Schema Questionnaire-3 (YSQ-3; Young, 2006). The disconnection/rejection domain, which is composed of 25 items, refers to the belief that one's needs of security, acceptance, and respect will not be met predictably. In this study, the following schemas of this domain were assessed: abandonment/instability (e.g., "I worry that the people I feel attached to will leave me or abandon me"), mistrust/abuse (e.g., "It's only a matter of time before someone betrays me"), emotional deprivation (e.g., "For most of my life, I have not had anyone to take care of me, share, and really care about what happens to me"), defectiveness/shame (e.g., "I think that no man/woman that I desire could love me when they see my flaws"), and social isolation/alienation (e.g., "People don't accept me anywhere"). This questionnaire is rated on a six-point scale, ranging from 1 (*completely untrue of me*) to 6 (*describes me perfectly*). Higher scores indicate the stronger presence of dysfunctional beliefs. In both waves, Cronbach's α coefficients were 0.93 for the disconnection/rejection domain.

Depressive symptoms were assessed with the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is composed of 20 items and is rated on a four-point scale, ranging from 0 (*practically never*) to 3 (*most of the time*). A sample item is "I thought my life had been a failure". The Spanish version of the CES-D exhibited excellent psychometric properties, and its factor structure was confirmed (Calvete & Cardeñoso, 1999). In the present study, Cronbach's α coefficients were 0.88 at W1 and 0.87 at W2.

Social anxiety symptoms were measured with the Social Anxiety Scale for Adolescents (SAS-A; La Greca & López, 1998). This scale has 18 items (e.g., "I worry that others don't like me", "I feel shy around people I don't know"). The SAS-A is rated on a five-point scale, ranging from 1 (*not at all*) to 5 (*all the time*). The Spanish version of the SAS-A showed good psychometric properties (Olivares et al., 2005). In this study, the Cronbach's α coefficients were 0.93 at W1 and 0.92 at W2.

Procedure

The present study is part of a broader project focused on the role of executive functions in psychological problems in adolescents. Several high schools in the Basque Country (Spain) were contacted randomly and sent a cover letter with information about this study; five ultimately took part. The parents of the adolescents received an informed consent form, and they had the option of refusing to allow their children to participate in the study (non-participation rate = 1.16%). Additionally, the adolescents were informed that their responses were confidential and anonymous and that their participation was voluntary. All of them agreed to participate. The adolescents completed the questionnaires of both waves in their classrooms. They took around 40 –60 min to complete Webexec, RPEQ, CBQ, YSQ-3, CES-D, and SAS-A at each wave. The Ethics Committee of the University of Deusto approved this study (ETK-5/18–19).

Data-analysis Plan

The Little's test of Missing Completely at Random (MCAR) was statistically significant, $\chi^2 (283) = 779.027$, $p < 0.001$, showing that missingness was not random. Thus, the full information maximum likelihood (FIML) approach with LISREL 8.8 software was employed to test the hypotheses of the study. The goodness of model fit was evaluated through the comparative fit index (CFI), Tucker–Lewis index (TLI), and root-mean-square error of approximation (RMSEA). In longitudinal research, CFI and TLI values of 0.95 or higher indicate a very good fit, and RMSEA values lower than 0.08 display adequate fit (Little, 2013).

In this study, the moderating role of PEF in the relationships between W1 victimization (traditional and online) and the W2 disconnection/rejection domain, internalizing symptoms of depression and social anxiety, and PEF was tested. Two different predictive models were elaborated, one for traditional victimization and the other for online victimization. The predictive models included autoregressive paths from W1 measures to the same W2 measures:

disconnection/rejection domain, depressive symptoms, social anxiety symptoms, PEF, and victimization (traditional or online). Finally, traditional or online perpetration and age were added to the models to control their potential relationships with the other variables over time. The two-way interaction plotter available on Jeremy Dawson's "Interpreting interaction effects" website was used to plot the moderation trajectories (Dawson, 2021).

Results

Descriptive Statistics and Correlation between Variables

Table 2 shows the rates of adolescents who suffered victimization at some point (traditional and online, in W1 and W2) as well as the distribution by sex and age. It can be observed that girls reported more victimization than boys, and, in general, older adolescents (15–17 years) reported more victimization than younger adolescents (12–14 years). In all groups, traditional victimization is more frequent than online victimization.

Table 3 displays the descriptive statistics and correlation coefficients between variables. W1 and W2 PEF were significantly and negatively correlated with all variables in the study except age, with which there was not a significant association. W1 PEF were also not related to W2 traditional victimization. All associations between the disconnection/rejection domain, depressive symptoms, social anxiety symptoms, victimization, and perpetration showed positive and significant relationships, except W1 perpetration (traditional and online) with W2 social anxiety symptoms and W1 traditional perpetration with the W2 disconnection/rejection domain, between which there was not a significant relationship. Age was significantly and positively associated with W1 perpetration (traditional and online) and the W2 disconnection/rejection domain.

Table 2 Sample Who Suffered Some Type of Victimization at Some Point

	Sex				Age				Full sample (N=680)	
	Girls (n=280)		Boys (n=400)		12–14 (n=386)		15–17 (n=294)			
	n	%	n	%	n	%	n	%	n	%
W1 Traditional victimization	195	76.8	264	73.4	270	75.8	189	73.2	459	75.1
W1 Online victimization	126	49.4	176	48.4	162	45.5	140	53.2	302	48.9
W2 Traditional victimization	176	71.8	240	70	240	70.2	176	71.5	416	70.8
W2 Online victimization	115	47.1	138	40.2	141	41.3	112	45.4	253	43.1

W1 Wave 1, *W2* Wave 2

Table 3 Descriptive Statistics and Correlation Between Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	M	SD
1. W1 Disconnection/rejection	1															52.87	20.75
2. W1 Depressive symptoms	.67**	1														15.72	9.53
3. W1 Social anxiety symptoms	.69**	.52**	1													36.78	13.40
4. W1 PEF	-.34**	-.41**	-.23**	1												19.27	3.58
5. W1 Traditional victimization	.39**	.42**	.40**	-.30**	1											12.28	4.21
6. W1 Traditional perpetration	.11**	.21**	.14**	-.32**	.50**	1										11.37	3.43
7. W1 Online victimization	.36**	.38**	.30**	-.27**	.53**	.39**	1									1.29	2.17
8. W1 Online perpetration	.19**	.22**	.14**	-.24**	.32**	.61**	.60**	1								0.91	1.68
9. W2 Disconnection/rejection	.72**	.53**	.53**	-.22**	.25**	.08	.30**	.14**	1							52.36	20.81
10 W2 Depressive symptoms	.52**	.62**	.40**	-.28**	.21**	.10*	.24**	.14**	.67**	1						15.59	9.23
11. W2 Social anxiety symptoms	.52**	.38**	.68**	-.15**	.27**	.05	.25**	.09	.65**	.54**	1					36.41	13.33
12. W2 PEF	-.30**	-.34**	-.19**	.57**	-.20**	-.14**	-.21**	-.18**	-.27**	-.38**	-.23**	1				19.06	3.49
13. W2 Traditional victimization	.27**	.33**	.25**	-.08	.42**	.16**	.40**	.21**	.42**	.41**	.36**	-.23**	1			11.76	3.32
14. W2 Online victimization	.22**	.30**	.20**	-.17**	.33**	.20**	.44**	.31**	.31**	.29**	.23**	-.22**	.50**	1		1.16	2.07
15. Age	.05	.01	.06	.04	-.03	.14**	.07	.12**	.12**	-.02	.07	-.07	-.02	.05	1	14.58	1.36

PEF Perceived Executive Functions, *W1* Wave 1, *W2* Wave 2

* $p < .05$; ** $p < .01$

Predictive Models

Online Victimization

The online victimization model showed excellent fit indices: FIML χ^2 (20, $N = 680$) = 73.109, $p < 0.001$, RMSEA = 0.063 (90% CI [0.048, 0.078]), TLI = 0.970, and CFI = 0.993. The unstandardized parameters and standard errors of the predictive model for online victimization are displayed in Fig. 1. Figure 1 shows that W1 depressive symptoms predicted fewer scores in W2 PEF. Moreover, W1 online victimization predicted increases in the W2 disconnection/rejection domain and W2 social anxiety symptoms.

PEF moderated the associations between W1 online victimization and the W2 disconnection/rejection domain and W2 internalizing symptoms of depression and social anxiety. Figures 2, 3 and 4 show the form of these interactions for adolescents who scored low (one *SD* below the mean) and high (one *SD* above the mean) in W1 online victimization and PEF. Figure 2 illustrates that adolescents with low PEF presented higher W2 depressive symptoms than those with high PEF when there was no victimization, whereas there were no differences between these two groups when
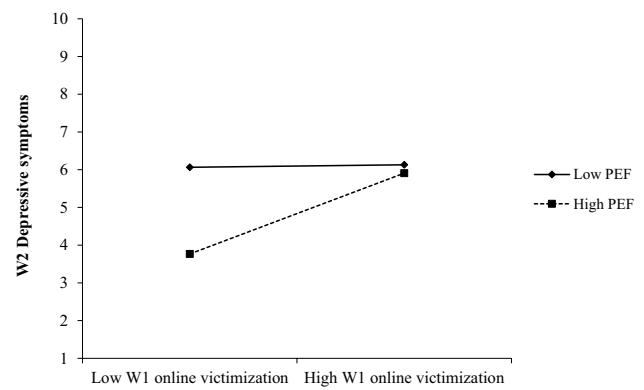

Fig. 2 Two-Way Interaction Between W1 Online Victimization and Perceived Executive Functions for W2 Depressive Symptoms. *Note*. PEF = perceived executive functions; W1 = wave 1; W2 = wave 2

victimization was high. The results of simple slope tests revealed a non-significant change in W2 depressive symptoms depending on victimization in those who showed low PEF ($B = 0.033$, $t = 0.09$, $p = 0.933$) and a marginally significant change in those high in PEF ($B = 1.071$, $t = 1.75$,
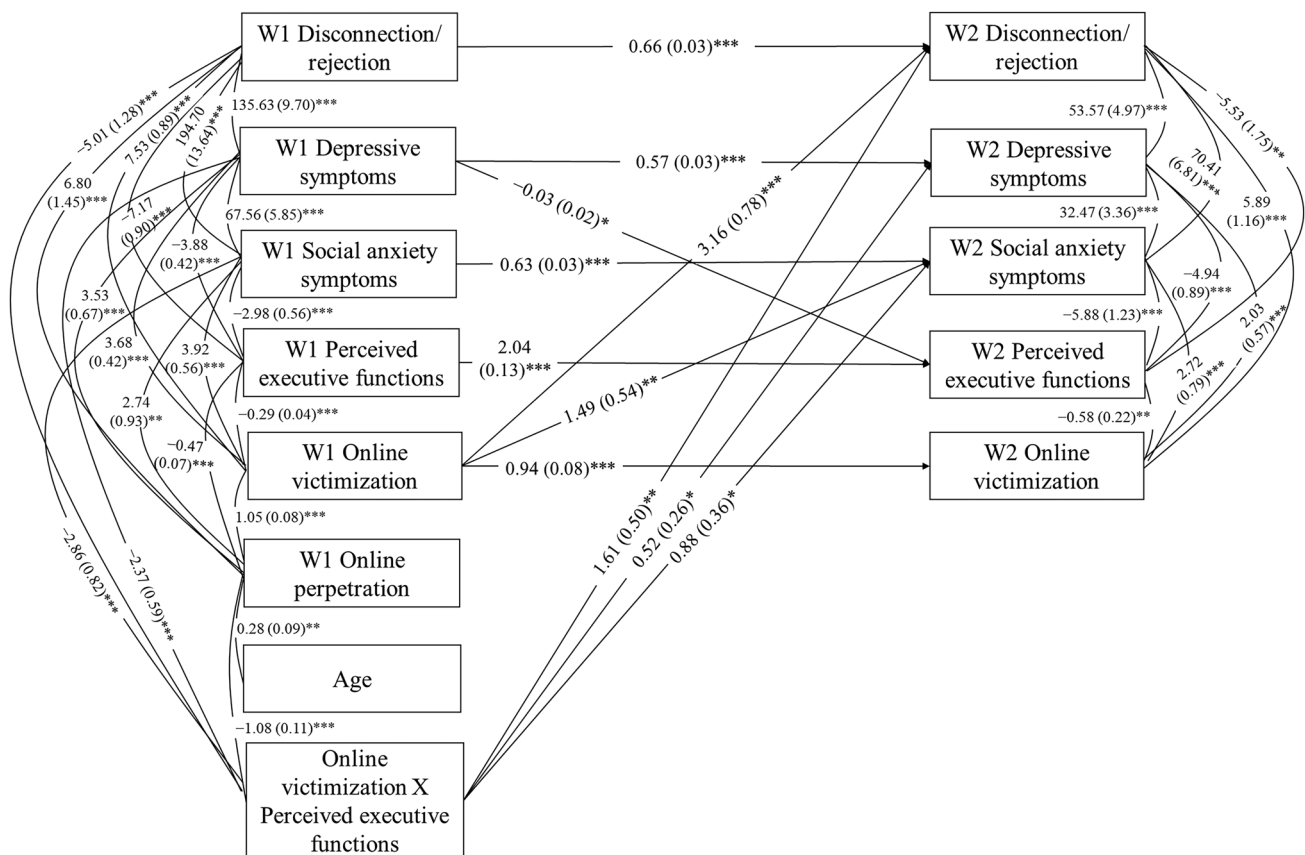

Fig. 1 Predictive Model for Online Victimization. *Note*. W1 = wave 1; W2 = wave 2. *$p < .05$; **$p < .01$; ***$p < .001$
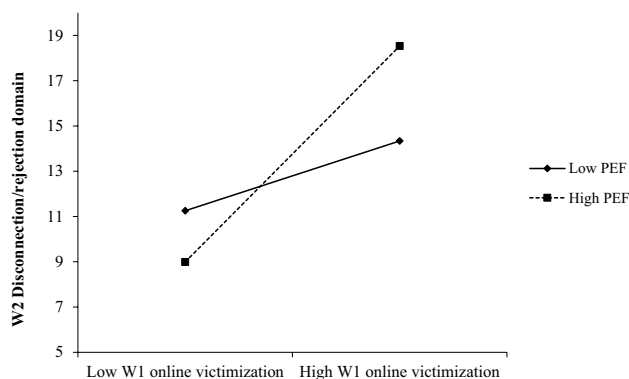
Fig. 3 Two-Way Interaction Between W1 Online Victimization and Perceived Executive Functions for the W2 Disconnection/rejection Domain. *Note*. PEF=perceived executive functions; W1=wave 1; W2=wave 2

$p=0.081$). Figures 3 and 4 show that high PEF and high W1 online victimization were associated with higher scores in the W2 disconnection/rejection domain and W2 social anxiety symptoms, respectively, than low PEF and high W1 online victimization. In Fig. 3, the slope of the association was positive and statistically significant when PEF were low ($B=1.542$, $t=2.02$, $p=0.043$) and high ($B=4.770$, $t=3.98$, $p<0.001$). The slope of the relationship shown in Fig. 4 was positive and non-statistically significant when PEF were low ($B=0.613$, $t=1.16$, $p=0.247$), but it was significant when they were high ($B=2.373$, $t=2.87$, $p=0.004$).

Traditional Victimization

The traditional victimization model displayed excellent fit indices: FIML χ^2 (20, $N=680$) $=96.962$, $p<0.001$, RMSEA $=0.075$ (90% CI [0.060, 0.091]), TLI $=0.967$, and CFI $=0.993$. Figure 5 shows the unstandardized parameters
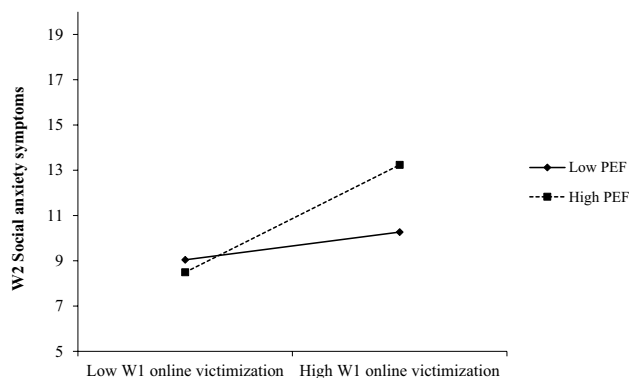

Fig. 4 Two-Way Interaction Between W1 Online Victimization and Perceived Executive Functions for the W2 Social Anxiety Symptoms. *Note*. PEF=perceived executive functions; W1=wave 1; W2=wave 2

and standard errors of the predictive model for traditional victimization. As can be seen in Fig. 5, W1 PEF predicted fewer W2 depressive symptoms. Meanwhile, W1 traditional victimization predicted higher scores on the W2 disconnection/rejection domain.

Additionally, PEF exhibited a moderating effect on the association between W1 traditional victimization and the W2 disconnection/rejection domain and W2 internalizing symptoms of depression and social anxiety. These moderating effects were similar for the W2 disconnection/rejection domain and W2 social anxiety symptoms in both models of victimization (traditional and online). Therefore, for traditional victimization, only the figure for W2 depressive symptoms is shown (i.e., Fig. 6). Specifically, Fig. 6 indicates the form of interaction in W1 traditional victimization and PEF for adolescents who scored low (one *SD* below the mean) and high (one *SD* above the mean). The slope for the association between victimization and depressive symptoms was higher in adolescents with high PEF ($B=0.631$, $t=0.90$, $p=0.371$) than in adolescents with low PEF ($B=-0.807$, $t=-1.60$, $p=0.111$), although it was not statistically significant in any subgroup.

Discussion

Victimization can lead to the development of dysfunctional cognitions and several internalizing problems in the victims. The main aim of the study was to determine whether PEF moderated the impact of traditional and online peer victimization on the development of the disconnection/rejection schema domain, internalizing symptoms of depression and social anxiety, and PEF in adolescents. The results indicated that PEF moderated the impact of victimization (traditional and online) on the development of the disconnection/rejection domain and symptoms of depression and social anxiety. Nonetheless, the role of PEF was different than expected.

In the case of depressive symptoms, adolescents with low PEF exhibited more depressive symptoms than those with high PEF, independently of their level of victimization (traditional and online). Therefore, when an adolescent perceives that he or she has deficits in executive functions, it can trigger feelings of sadness, failure, and hopelessness (Hankin et al., 2016), regardless of the level of victimization. The harmful effects of victimization (traditional and online) were observed in adolescents with high PEF. A possible explanation for this is that victimization by peers can produce profound changes in the way in which adolescents perceive themselves and the world (Calvete et al., 2016a, 2018), which would conflict with their self-perception of executive functions. The high contrast between the negative beliefs created by victimization and their high PEF would then lead them to develop similar depressive symptoms as
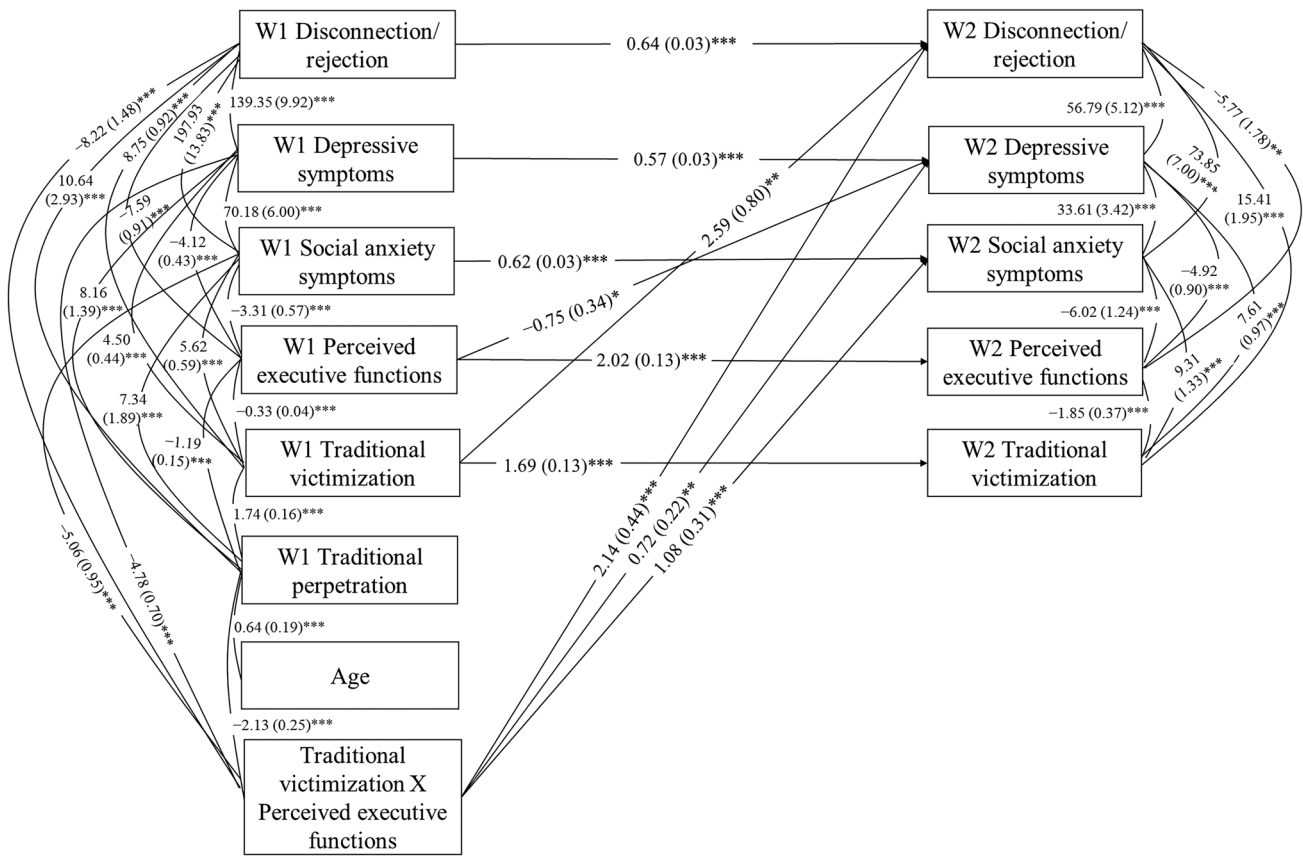
Fig. 5 Predictive Model for Traditional Victimization. *Note*. W1 = wave 1; W2 = wave 2. *p < .05. **p < .01. ***p < .001
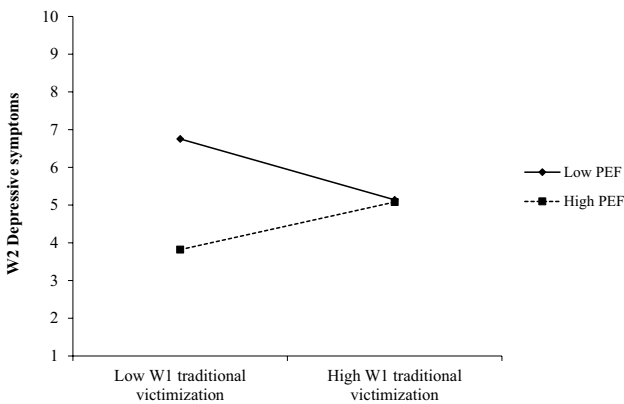

Fig. 6 Two-Way Interaction Between W1 Traditional Victimization and Perceived Executive Functions for W2 Depressive Symptoms. *Note*. PEF = perceived executive functions; W1 = wave 1; W2 = wave 2

victims with low PEF. Thus, victimization eliminates the beneficial effects of high PEF. Furthermore, in both victimization models, non-victims with high PEF showed fewer depressive symptoms than those with low PEF. In this way,

PEF may serve a protective role, as resilience (Santos et al., 2021) and dispositional mindfulness (Faura-Garcia et al., 2021), against the development of depressive symptoms, but only in non-victims. Finally, it is important to highlight that the slopes of those who showed low and high PEF were not significant for depressive symptoms, so these findings should be considered with caution.

Victimization affected the disconnection/rejection domain, with a greater effect in adolescents with high PEF. In alignment with the literature, these results support the notion that the experience of victimization, both traditional and online, can contribute to developing ideas that one is defective, will not receive emotional support, and will be abused, abandoned, or isolated, changing how adolescents perceive themselves and their social context (Calvete et al., 2016a, 2018; Young et al., 2003). Additionally, in non-victims, adolescents with high PEF displayed lower scores on schemas of the disconnection/rejection domain than those with low PEF. However, among victims, the pattern was the opposite, with adolescents high in PEF scoring higher in EMSs. Therefore, high PEF also protected against the development of these schemas, but only in non-victims. This protective role could be very beneficial since, as numerous studies have found,

EMSs can lead to the development of depressive symptoms and social anxiety symptoms in adolescents (e.g., Alba et al., 2018; Calvete, 2014). In fact, in this study, EMSs and psychological symptoms of depression and social anxiety were positively associated.

Victimization showed more impact on social anxiety symptoms in individuals with high PEF. Therefore, in adolescents with high PEF, the negative effect of victimization could be more harmful than in those who perceive that they have deficits in executive functions, perhaps since the latter already have a negative perception of themselves. This effect was seen in other studies in which individuals with a less negative perception of themselves and the environment were more affected by stressful events than those who had a more negative perception (Cámara & Calvete, 2012; Schmidt & Joiner, 2004).

This study also evaluated whether victimization worsened PEF, but the results did not show such an effect, contrary to previous studies (e.g., Ji et al., 2018). This lack of significant results contrasts with that obtained for the disconnection/rejection domain since, in line with previous studies (Calvete et al., 2016a, 2018), victimization predicted an increase in the disconnection/rejection domain. Furthermore, online victimization predicted higher social anxiety symptoms, as in previous research (Coelho et al., 2022), showing that victimization via the Internet can lead to the development of fear and anxiety in social situations.

The present study has some limitations that provide opportunities for future research. First, both predictive models included victimization by peers (traditional or online). It would be interesting to study other types of victimization, such as dating abuse or abuse by parents, to analyze whether the role of PEF is maintained or changed depending on who commits the abuse. In relation to this limitation, in this study we estimated separate models for traditional and online victimization so that the number of model parameters would not be too large, but it would be interesting in studies with larger samples to estimate models that integrate several victimization modalities and thus control for overlap. Second, this study focused on global PEF. Future studies could analyze how specific PEF (e.g., cognitive flexibility) behave in these models, as differences could emerge when they are studied individually (e.g., Dickson et al., 2017). Third, it is common for the evaluation of executive functions in children and adolescents to use, apart from self-report questionnaires, other observation-based assessments, such as parents' and/or teachers' reported executive functions (e.g., Mullin et al., 2020). Hence, future studies could examine whether different observation-based assessments influence victimization differently. Fourth, this study only included two waves, so it would be interesting to replicate it with more measurements over time. Fifth, the RPEQ instrument distinguishes between overt and relational forms of aggression, so it would have been interesting to study how each form of aggression can influence the

variables studied. Future studies could delve into these relationships. Finally, despite adding age to both models to control its association with the other variables, given that executive functions develop during adolescence, the relationships studied could vary during this stage, and these results need to be considered with caution. Future studies should examine whether the role of PEF is invariant through adolescence.

Despite these limitations, this study also has significant strengths. Victimization, both traditional and online, was analyzed using two different predictive models, making it possible to study the particularities and the role of PEF in each type of victimization. In addition, the longitudinal design of the study enabled examining the role of PEF in adolescents when victimization occurs, filling a gap in the literature. Furthermore, this study contributes to the knowledge on the longitudinal relationship between PEF and EMSs in adolescents, also filling a gap in the literature.

Conclusion

In conclusion, when PEF are high, adolescents who experience victimization (traditional and online) develop more schemas of the disconnection/rejection domain and internalizing symptoms of depression and social anxiety. In addition, high PEF exhibited a protective role in non-victims against depressive symptoms and schemas of the disconnection/rejection domain. These findings indicate that PEF have a protective role that is eliminated when victimization occurs. In interventions targeting victims of peer aggression, we should examine what mechanisms are in place to understand why adolescents with higher initial levels of PEF are more affected by victimization. These adolescents may require specific help to elaborate and make sense of the victimization experience. Additionally, it is possible that showing them that they have valuable tools (i.e., executive functions) for dealing with experiences of harassment and how they can use them may help to prevent the development of internalizing problems and EMSs. Hence, adolescents will perceive and be aware that when they experience harassment, they have the tools to manage it. Additionally, it is important to underline that girls and older adolescents (15–17 years) are the ones who reported suffering greater victimization, so it is necessary to pay special attention to these groups in these interventions.

Authors' Contributions A.M. collaborated with the design of the study, analyzed the data, wrote the paper, prepared the tables, and revised the references; E.C. designed the study, collaborated with the writing of

the study, analyzed the data, and wrote part of the results. All authors approved the final version of the manuscript for submission.

Availability of Data and Material This manuscript's data will be deposited at OSF (https://osf.io/GUB6F).

Declarations

Conflict of Interest The authors declare no competing interests.

Ethics Approval The procedures of this study have been approved by the institutional research committee of the University of Deusto and have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Consent to Participate Informed consent was obtained from all individual participants included in the study and their parents/guardians.

Experiment Participants The participants were 680 adolescents.

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