Psychosocial Intervention

A Preventive Intervention to Reduce Risk of Online Grooming Among Adolescents

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ABSTRACT

Sexual abuse of adolescents by adults on the Internet is a severe risk with negative consequences for the victims. However, there is an important gap in the development of preventive interventions to address this problem. This study evaluated the efficacy of a brief (less than one hour) educational intervention on online grooming (less than one hour) in reducing adolescents' sexual interaction behaviors with adults when they are sexually solicited. A sample of 856 Spanish adolescents (48% girls, ages 11-17 years) was randomized into two intervention conditions (educational intervention about online grooming and a resilience control intervention). Adolescents completed measures of online sexual solicitation by adults and sexualized interactions with adults at pretest and at three- and six-month follow-ups. Measures of their knowledge about online grooming were taken at pretest, postintervention, and at three- and six-month follow-ups. The results of multilevel analyses indicated that the intervention reduced sexualized interactions when adolescents were sexually solicited by adults (β = -.16, SD = .07, t = -2.44, p = .015). Moreover, the intervention increased adolescents' knowledge about online grooming over time (β = 1.95, SD = .19, t = 10.52, p < .001). These findings suggest that a brief educational intervention about online grooming may be a promising, low-cost intervention to reduce the risks of sexual abuse on the Internet.

Una intervención preventiva para reducir el riesgo de *grooming online* entre los adolescentes

RESUMEN

El abuso sexual de adolescentes por parte de adultos en Internet (*grooming online*) es un riesgo grave con consecuencias negativas para las víctimas. Sin embargo, existe un importante vacío en el desarrollo de intervenciones preventivas para abordar este problema. Este estudio evalúa la eficacia de una intervención educativa breve (menos de una hora) sobre el *grooming online* para disminuir las conductas de interacción sexual de los adolescentes con adultos cuando son solicitados sexualmente. Una muestra de 856 adolescentes españoles (48% chicas; edades entre 11 y 17 años) fue aleatorizada en dos condiciones de intervención (intervención educativa sobre el *grooming online* y una intervención control de resiliencia). A los adolescentes se les aplicaron medidas de solicitud sexual online por parte de adultos e interacciones sexualizadas con adultos en la línea base y en los seguimientos a tres y seis meses. Además, se tomaron medidas sobre conocimiento del *grooming online* en la línea base, después de la intervención y en los seguimientos a tres y seis meses. Los resultados de los análisis multinivel indicaron que la intervención redujo las interacciones sexualizadas cuando los adolescentes eran solicitados sexualmente por adultos (β = -.16, SD = .07, t = -2.44, p = .015). Por otra parte, la intervención aumentó los conocimientos de los adolescentes sobre *grooming online* a lo largo del tiempo (β = 1.95, SD = .19, t = 10.52, p < .001). Estos resultados sugieren que una breve intervención educativa sobre *grooming online* puede ser prometedora y de bajo coste para reducir los riesgos de abuso sexual en Internet.

Adolescence is an important stage in the development of sexuality. At the same time, adolescents spend a great deal of time on the Internet. For example, 91% of them use social networks on a daily basis, with WhatsApp, YouTube, Instagram, and Facebook being the most used applications (Wavemaker, 2020). Furthermore, in a recent study on Spanish adolescents and young adults, 23% reported using the Internet for more than three hours per day (Oliva et al., 2019). As the time that adolescents spend interacting with others

in digital contexts increases, the Internet often becomes a context where adolescents explore ways to express their sexuality (Choi et al., 2019; Cooper et al., 2016). Sometimes, this process can involve serious risks for adolescents, who can become targets of sexual abuse by adults, including online grooming (Calvete, Fernández-González, et al., 2021; Gámez-Guadix, De Santisteban, et al., 2021).

Online grooming is the process through which an adult manipulates a minor over the Internet for the purpose of sexually abusing the minor (Chiu & Quayle, 2022; Whittle, Hamilton-Giachritsis, & Beech, 2013). This process can include both sexual solicitations of minors by adults to engage in conversations or send sexual content online as well as sexual interactions with the adult, either online or in person (Kloess et al., 2014). Online grooming involves a complex psychological manipulation process that can last from days to years (De Santisteban & Gámez-Guadix, 2017; Wachs et al., 2018). While online grooming tends to be a gradual process over time intended to trick the minor, sexual solicitations are specific events in which the adult asks for sexual content from the minor (Calvete, Fernández-González, et al., 2021). Strategies to trap the child in the abusive relationship may include deception by the adult (e.g., about the abuser's hobbies or age), showing interest in the victim's life (e.g., minors' problems with family or friends), giving material goods to the minor (money, photo sessions, etc.), progressive sexualization of the minor (e.g., through sexual jokes or comments), or explicit aggression (e.g., through blackmail or threats) (Gámez-Guadix, De Santisteban, et al., 2021; Ringenberg et al., 2022). Through the processes involved in online grooming, such as progressive sexualization, the abusive adult could subtly manipulate the minor to normalize the sending and sharing of sexual material (Broome et al., 2018). So-called "fantasy driven" offenders (Broome et al., 2018) seek to view, generate, and share child pornographic videos without direct physical contact.

Recently, Calvete, Fernández-González, et al. (2021) found that the rates of online sexual solicitation of adolescents by adults ranged from 13.9% to 17.8%, and the percentage of adolescents who sexually interacted with adults in response to these solicitations ranged from 5.4% to 7.6%. The consequences of online grooming can be extremely negative for adolescents. Online grooming has been related to important mental health outcomes for the victims, including depressive symptoms, anxiety, suicidal ideation, and posttraumatic stress (Donmez & Soylu, 2020; Whittle, Hamilton-Giachritsis, Beech, & Collings, 2013; Ybarra et al., 2007).

Myths, misinformation, and erroneous beliefs about grooming are frequent among adolescents. These myths include the idea that only girls are victims, that the victim is to blame because she allows herself to be deceived, that only men are aggressors, or that aggressors are easily recognizable (Montiel, 2018). In a recent study, 77% of minors did not know that online grooming is a form of sexual abuse, 59% did not know that boys could also be victims of online grooming, and one in four thought that minors who experience situations such as online grooming are responsible because they allow themselves to be deceived. In turn, these myths are significantly related to receiving more sexual requests from adults (Gámez-Guadix, Roman, et al., 2021). Therefore, providing adolescents with adequate knowledge about online grooming could be an effective prevention tool.

It has been recommended that online grooming prevention should be based on numerous perspectives (Wurtele & Alexander, 2016). Undoubtedly, it is important to focus on offenders, who bear the ultimate responsibility for perpetrating online grooming. However, in a review, Forni et al. (2020) found few preventive activities aimed at offenders, and those they did find mostly targeted people who had already exhibited abusive behaviors. However, it would be advisable to plan preventive measures aimed at potential offenders before they commit abuse. Another common approach has involved educational actions aimed at

children and adolescents (Jones et al., 2014). These actions usually consist of showing minors the risks on the Internet and giving them recommendations for protecting themselves, such as avoiding chat rooms or discussion areas that look sketchy or provocative and keeping their identities private (Wurtele, 2017). For example, the Internet safety program "ThinkUKNow" aims to offer advice on Internet safety to children and adolescents, with an emphasis on sexual exploitation and abuse (Davidson et al., 2009). Another approach has been to work with parents and guardians of children and adolescents in order to improve parent-child communication about Internet safety (Wurtele & Alexander, 2016). However, there are many other potential areas for prevention, which have been developed to a lesser extent. These include policy and legislation and the commitment of Internet-based companies to ensuring the safety of online spaces (Quayle, 2020).

Unfortunately, there is a paucity of research on the effectiveness of the preventive actions that have been implemented (Forni et al., 2020). For instance, regarding educational interventions focused on adolescents, few studies have explicitly evaluated the effects of interventions on the risks of online sexual behaviors. In a recent exception, a growth mindset intervention combined with a self-affirmation intervention reduced the reciprocity between online sexual solicitation and sexual interaction behaviors with adults (Calvete, Cortazar, et al., 2021). Additionally, the results of an intervention focused on improving adolescents' knowledge and reducing myths about grooming among adolescents (Gámez-Guadix, Roman, et al., 2021) were promising, as the adolescents who received the intervention had fewer erroneous misconceptions and more accurate knowledge about online grooming compared to the control group. However, the study did not examine whether the intervention changed the extent to which minors were engaged in sexual interactions with adults.

Overview of the Present Research

As described above, given the high rates of adolescents who are online sexually victimized, there is a need for preventive action against online grooming. Although minors are not responsible for the problem but their victims, providing them with knowledge and resources to defend themselves is important. Thus, an important preventive strategy is to ensure that adolescents who are sexually solicited on the Internet do not respond with risky behaviors such as sending and sharing confidential information and sexual material about themselves. The main aim of this study was to test whether a brief educational intervention about online grooming reduced adolescents' sexualized interactions with adults when they are sexually solicited by adults online. In addition, we examined whether the intervention increased their knowledge about online grooming. The intervention was based on the intervention developed by Gámez-Guadix, Roman, et al. (2021). Although this intervention has shown promising results in terms of increasing adolescents' knowledge and supporting appropriate attitudes about online grooming of minors, its effects on sexual interactions with adults have not been analyzed.

This study represents a secondary analysis of data drawn from a clinical trial [NCT04509531, clinicaltrials.gov code] testing the relative effects of a resilience intervention to reduce psychological problems resulting from online victimization by peers. The effects of the resilience intervention on depression, social anxiety, eating problems, self-injury, and aggressive behavior are reported elsewhere (Calvete et al., 2022). The effects of the preventive intervention targeting online grooming on the outcomes of this study (sexualized interactions with adults and knowledge about online grooming) have not been published elsewhere.

Method

Participants

Based on an a priori power analysis (G*Power), a sample of ~800 participants was indicated for a small effect size (0.15), with an alpha of .05 and a power of 90%. The schools were selected by convenience sampling from a list of schools in Bizkaia. We initially chose 20 schools, trying to ensure that they included diverse socio-economic profiles. From the contacted schools, seven did not respond and eight refused to participate. Finally, five educational centers agreed to participate. Of those that agreed to participate, two schools were public and the other three were private. The final study sample was made up of 856 adolescents (52% boys and 48% girls), who were between 11 and 17 years of age at pretest ($M = 14.55$, $SD = 1.59$). Regarding their sexual orientation, 73.5% indicated that they were heterosexual, 2.1% were gay, 10.3% were bisexual, 2.4% were not attracted to any sex, and 11.4% did not indicate their sexual orientation. As a function of grade, 352 participants were in the first cycle of secondary education (Grades 7 and 8), 260 were in the second cycle of secondary education (Grades 9 and 10), and 244 were in the last two years of high school (Grades 11 and 12). According to the criteria determined by the National Institute of Statistics for jobs, parents were classified as follows: scientific and intellectual professionals (39.7%), restaurant and security service workers and vendors (16.8%), accounting and administrative employees (10.0%), technicians and support professionals (8.5%), artisans and skilled workers in the manufacturing and construction industries (6.6%), housewives (4.7%), unemployed (4.7%), directors and managers (3.0%), machinery operators (2.9%), elementary occupations (2.9%), and skilled workers in the agricultural, livestock, forestry, and fishing sectors (0.3%). Regarding the representativity of the sample, only 4.7% of the parents were unemployed, while in the Spanish population the unemployment rate is 13.75%. However, if we consider the territory in which the study was carried out, Basque country, the unemployment rate is 8.69%. On the other hand, the category of scientists and intellectual professions was also overrepresented; in this sample it was 39.7%, while the data of the National Statistics Institute (2020) report 19.2% for this category. However, we must be careful when comparing these percentages since we have calculated the percentages for our complete sample, whereas the percentages provided by the National Statistics Institute refer to people who are employed (not counting the unemployed). The other categories obtained a more similar prevalence.

Study Design and Procedure

The Ethics Committee of the University of Deusto approved this research project. After being informed about the study, adolescents and their parents voluntarily decided whether or not to participate. We carried out a double-blind randomized controlled trial (RCT) with two groups [NCT04509531 clinicaltrials.gov code]. The first group received a preventive online grooming intervention, while the other group, which in this study was a control group, received a resilience intervention. A total of 870 adolescents, with basic reading comprehension according to their school tutors, from those five educational centers were invited to participate. The parents of 12 of them (1.4%) did not agree to the participation of their children. Furthermore, two participants were excluded because they were over 18 years of age. The final sample, therefore, consisted of 856 adolescents. Randomization was done at the individual level within each classroom on the day of the intervention. A total of 397 adolescents (mean age = 14.55, $SD = 1.59$, 49.40% female) were allocated to the educational intervention about online grooming (experimental condition), and 459 (mean age = 14.55, $SD = 1.58$, 47.10% female) were allocated to the active control condition.

The participants received the intervention on their classroom computers through Qualtrics©. They also filled out the questionnaires through this platform. The pretest measurements (time 1, T1) were taken one week before the intervention (between September and October 2020, at the time agreed with the schools). Post-test measurements of sexualized interactions at time 2 (T2) and time 3 (T3) were taken three and six months after the intervention (between December 2020 and January 2021 and between March and April 2021, respectively). Knowledge measures about online grooming were also taken on the same day of the intervention, just after finishing it. Class times were used to administer the interventions and assessment measures. Both the experimental and the control interventions lasted approximately 40 minutes. All materials, including the interventions and measures, were presented in both Spanish and Basque in order to adapt them to the primary language of the participants. Due to the COVID-19 pandemic, three of the schools completed the intervention in their schools without the presence of the research assistants. In these cases, the steps to follow were explained in detail. Figure 1 (Consort Diagram) shows the flow of participants and the dropout rates in each step, for which the main reason was illness.

Measures

Online grooming behavior was measured using the Online Sexual Solicitation and Interaction of Minors with Adults Questionnaire (Gámez-Guadix et al., 2018). This questionnaire contains ten items with four response options ranging from 0 (*never*) to 3 (*6 or more times*). The Sexual Solicitation includes five items that describe sexual requests made by an adult to an adolescent, and an example item is "An adult asked to me online to have cybersex via a webcam." The Sexualized Interaction factor includes five items that describe behaviors of adolescents related to intimate or sexual interactions with adults, such as "I talked about sexual things with an adult through the Internet." Mean scores for item responses were calculated, which ranged from 0 to 3. This scale has shown good psychometric properties among adolescents, including content, factorial, and convergent validity (Gámez-Guadix, De Santisteban, et al., 2018). In a recent longitudinal study, ordinal α coefficients ranged between .96 and .98 for sexual solicitation and between .91 and .98 for sexualized interaction (Calvete, Fernández-González, et al., 2021). In the current study, ordinal α coefficients for the sexualized interaction scale were .89 in the pretest and .97 at the three- and six-month follow-ups. The ordinal α coefficient for sexual solicitation was .95 in the pretest.

The Online Grooming Information and Myths Questionnaire (Gámez-Guadix, Roman, et al., 2021) includes 10 questions regarding knowledge and myths about online sexual abuse of minors. This questionnaire assesses the degree of knowledge and appropriate attitudes adjusted to reality regarding the online sexual abuse of minors based on previous qualitative studies (De Santisteban et al., 2018; Montiel, 2017). Example items include "The aggressors through the Internet are only adult men, unknown, and easily detectable by their appearance" and "Boys can also be victims of online child sexual abuse." The adolescents were asked to indicate the veracity of each of the statements in the questionnaire by choosing one of the following options: "False," "True," or "I don't know." The scores range between 0 and 10. This inventory was administered at four time points (pretest, postintervention, and three- and six-month follow-ups). To code this questionnaire, the answers were dichotomized (correct answers = 1, incorrect answers or "I don't know" = 0). Thus, the questionnaire score reflects the number of items answered correctly by each participant. This question-
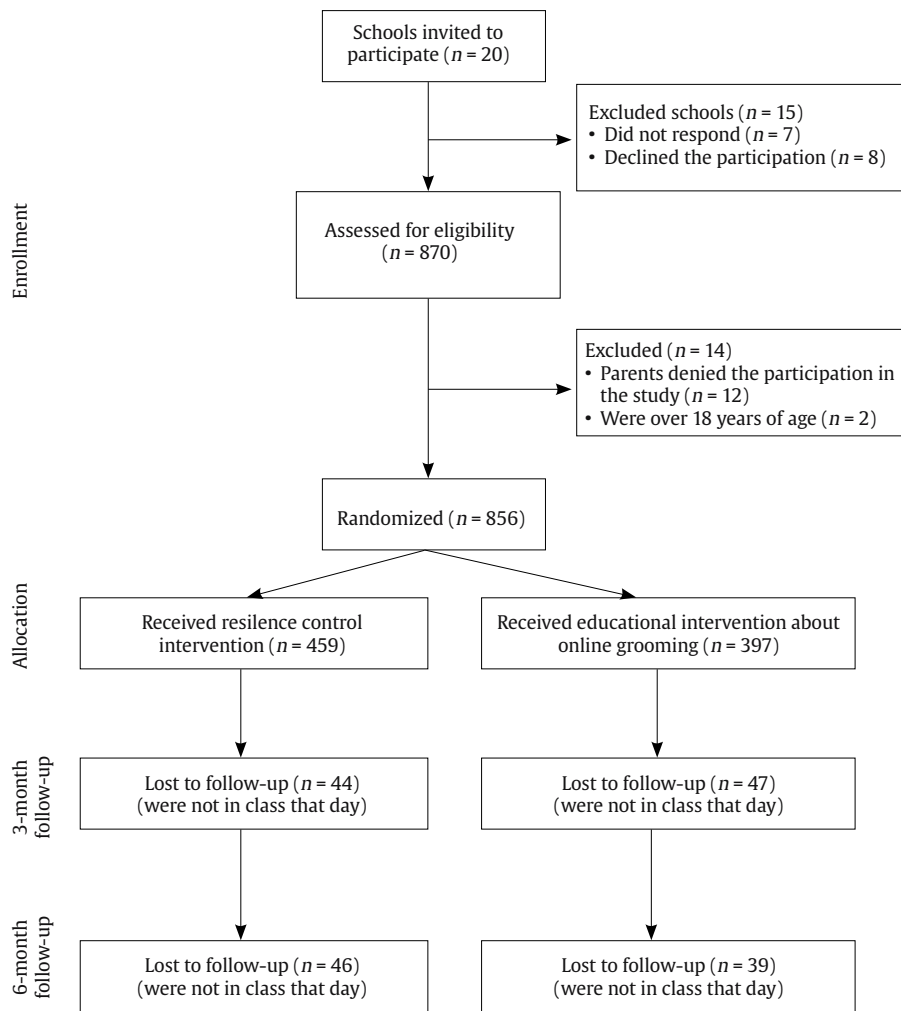
Figure 1. Consort Diagram.

naire's internal consistency (Cronbach's α) was .60, and test-retest reliability (2 weeks) was .65 (Gámez-Guadix, Roman, et al., 2021). In the current study, α was .72 in the pretest, .82 in the postintervention, .72 at the three-month follow-up, and .84 at the six-month follow up.

Interventions

Preventive Intervention of Grooming

This intervention was based on the preventive intervention for online grooming of adolescents developed by Gámez-Guadix, Roman, et al. (2021). The intention of the intervention is to increase awareness of online grooming as well as to provide prevention advice. Effective prevention plans actively engage adolescents, offering educational and age-appropriate knowledge, shaping specific attitudes and self-efficacy, and teaching specific skills, such as behaviors that reduce risks, coping strategies, and problem-solving (Boustani et al., 2017). Adolescents were actively involved by asking them to do some written reflection on the information presented. For example, the program included real situations of online grooming written by other adolescents of the same age. It has been argued that educational interventions benefit from including youth voices about technology-related risks and responses (Wurtele, 2017). After reading these situations,

the participants had to write what they would say to a person of their age to try to prevent something similar from happening. This strategy has been used in numerous interventions focused on a variety of adolescent problems, including online risks (Calvete, Cortazar, et al., 2021; Miu & Yeager, 2015). Based on these premises, the intervention was divided into three parts. First, the adolescents were educated about online grooming and sexting through relevant films, real-life examples, and educational information. The adolescents were encouraged to actively think about the characteristics of the grooming situation, the negative outcomes and drawbacks of a relationship between an adult and a minor, and to empathize with the victims. Second, they were urged to write down the risks associated with online grooming and sexting in order to think about them and get more involved. Finally, they were asked what they would do if an adult approached them with sexual material, and they were provided with some preventative and coping strategies. An example of applied activity was a short video with a real situation in which a 14-year-old girl is solicited on the Internet by an adult in his 30s, who is pretending to be a younger boy. They have flirtatious conversations, sending each other sexy photos and developing an increasingly close relationship. The girl is excited to meet the alleged teenager. When she finally meets the adult in person, he takes her to a hotel room and sexually abuses her. After watching this video, the adolescents were encouraged to think about the situation, empathize with the victim, reflect on

how they would help the victim, and consider possible prevention and coping strategies. The intervention was designed so that it could be understood by most high school students. For this reason, the language was simple and the texts were accompanied by non-verbal materials, such as videos and images. This intervention was applied online and took less than one hour to complete. Materials available at osf.io/qbw6y.

Resilience Intervention

This intervention focused on the idea that people can change and extended the intervention developed by Miu and Yeager (2015) to online peer aggression situations. Along with scientific information on the possibility of personality change, numerous testimonies are included in the form of videos and written stories from other adolescents who have experienced peer online victimization situations, conveying the message that people who act aggressively against others can change their behavior. The intervention includes materials that support the premise that people's reactions to stressors can change over time as well as examples of different ways to cope with stress (e.g., distraction, relaxation, sport, social support, cognitive restructuring, and gratitude). The intervention is described in detail in Calvete et al. (2022).

Overview of the Statistical Approach

We used hierarchical linear modeling 8 (HLM 8; Raudenbush et al., 2019) with a full information maximum likelihood (FIML) estimator and robust standard errors. FIML estimates parameters based on all available data, including cases with missing data values. All variables except knowledge about online grooming were transformed (square root transformation) to attenuate the lack of normality in their distribution. We estimated separate models for sexualized interactions with adults and knowledge about online grooming. The model for sexualized interactions with adults included the construction of level 1, 2, and 3 equations. At level 1, regression equations modeled the variation in the repeated measures of sexualized interactions as a function of sexual solicitations and time. Time was coded as 0, 1, and 2. Sexual solicitation was centered around the mean of the individual. At level 2, equations were specified that modeled individual differences in the level 1 parameters (i.e., intercept and slope) as a function of between-subject variables. Level 2 predictors of the intercept included condition (0 = control, 1 = experimental), gender (0 = boy, 1 = girl), and age. Both the intercepts and the slopes of the association between sexual solicitation and sexualized interactions were specified as random. Finally, at level 3, we included the classrooms ($n = 34$).

A different model was estimated for knowledge about online grooming. At level 1, time was the only predictor of knowledge about online grooming. Time was coded as 0, 1, 2, and 3, as this measure was also taken on the day of the intervention. Because preliminary analyses indicated that the trajectory of the outcome was curvilineal, a quadratic component was included in the model. At level 2, the intervention was included as predictor of both the linear and the quadratic components.

Results

Table 1 displays the main descriptive statistics of the variables and their correlation coefficients. Correlations between sexual solicitation and sexualized interactions with adults were between moderate and high. Correlations between these variables and online grooming knowledge scores were small. Age was positively and significantly associated with all the study variables.

Table 1 also displays gender differences in all study variables. Girls scored higher than boys on all variables except sexualized interaction at the six-month follow-up. Overall, the effect size (Cohen's *d*) for gender differences was small for sexual solicitation and sexualized interactions and medium for grooming knowledge scores. Table 2 shows the prevalence percentages of sexual risk behaviors. The percentages for sexual solicitation ranged between 12.9 and 15.4 and were significantly higher among girls. The percentages of adolescents who responded with sexual interaction behaviors with adults ranged between 6.4 and 7.2 and they were also significantly higher among girls, although the differences were not as notable. According to Cramer's V values, the effect sizes for gender differences were small (< .30).
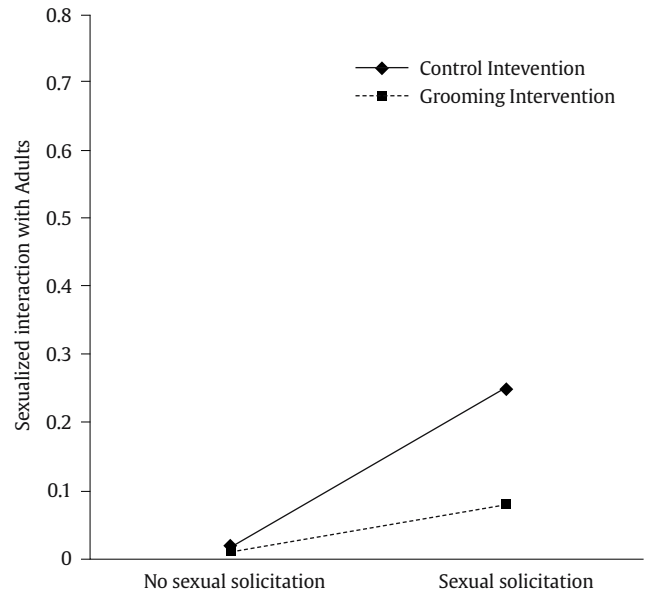
Figure 2. Moderating Effect of the Preventive Intervention on Sexualized Interactions with Adults.

Table 3 displays the regressive coefficients for the mixed effects for sexualized interactions with adults. Sexual solicitations predicted sexualized interactions with adults and the intervention moderated the predictive association between sexual solicitation by adults and sexualized interactions with adults. Figure 2 shows the form of this association for adolescents with and without sexual solicitation. The slope for adolescents in the control intervention was positive and statistically significant ($\beta = .23$, $t = 4.65$, $p < .001$), whereas it was not significant for adolescents in the preventive grooming intervention ($\beta = .07$, $t = 1.31$, $p = .191$)

In addition, the results of the multilevel analysis indicated that older participants and girls were associated with higher scores on sexualized interactions with adults. Finally, the time x intervention interaction was not statistically significant, indicating that the beneficial effects of the intervention were exclusively due to a decrease in the responses to sexual solicitations by adults.

Next, we examined the effects of the intervention on the adolescents' knowledge about online grooming. Table 4 shows the coefficients of the predictive model. The results of the multilevel model indicated that the intervention moderated both the linear and the quadratic components of the model. Figure 3 displays the effect of the intervention on the scores on knowledge about online grooming. In the group that received the preventive intervention, the scores increased after the intervention, although a decline occurred between the three- and six-month follow-ups. The control group displayed an inverse trajectory.
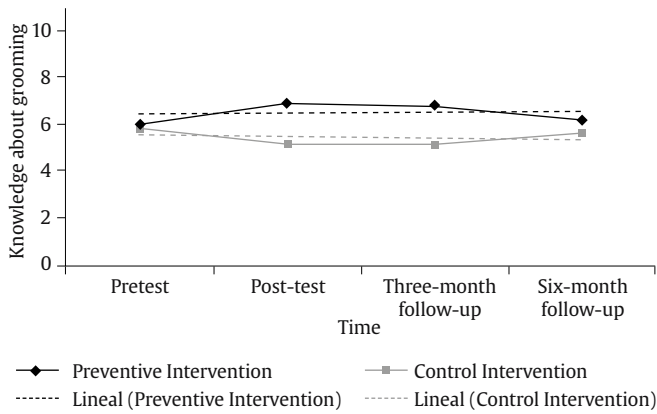
Figure 3. Trajectories of Scores on Knowledge about Online Grooming.

Discussion

The Internet is a setting in which children and adolescents can be the victims of sexual abuse by adults (Gámez-Guadix, De Santisteban, et al., 2021; Ringenberg et al., 2022). However, despite the dramatic consequences of adult sexual victimization on the Internet (Whittle, Hamilton-Giachritsis, Beech, & Collings, 2013; Ybarra et al., 2007), there is an important gap in the development of universal preventive interventions addressing this problem. The aim of this study was to evaluate the efficacy of an online grooming education intervention in reducing sexual interaction responses when adolescents are sexually solicited by adults over the Internet. The effects of the intervention on online grooming knowledge was also examined.

The educational intervention protected adolescents when they were sexually solicited by adults online, such that adolescents reported that they were less likely to respond with behaviors such as sharing or sending photos and videos of themselves of a sexual nature. This result is important because it shows that a brief intervention of less than one hour, delivered in an automated format over the Internet, can have positive effects on the prevention of online sexual abuse. Moreover, the use of control conditions that include positive messages about a different target than the experimental condition

has recently been recommended (Schleider et al., 2020). Thus, in this study, participants in the control group received an intervention with a different target—the development of resilience against online peer victimization—so the testing of the efficacy of the educational intervention on grooming was particularly strict. Therefore, the fact that statistically significant results were obtained with strict conditions for evaluating the effectiveness of the intervention reinforces the importance of the results.

Notably, the intervention had a clear effect on biases and myths about online grooming. The adolescents who received the educational intervention improved their knowledge about online grooming. Although the effect was observed especially after the intervention and at the three-month follow-up, the pattern of improvement compared to the control group was maintained throughout the time of the study. It is important to remember that the assignment of the adolescents to the experimental conditions took place within each classroom, so in the same classroom approximately half of the adolescents received the educational intervention. This implies that the adolescents were able to chat and share knowledge with their classmates, which may have attenuated the differences between groups at the follow-ups.

The study also provides data on the prevalence of online grooming behaviors among Spanish adolescents. In this study, the percentage of adolescents who were sexually solicited by adults was high, especially in the case of girls (21.2% at the beginning of the study). Fortunately, not all adolescents who are solicited respond with sexual interaction behaviors with adults. However, the percentage of those who do is of concern (between 6.4 and 7.2% in this study). Probably, girls became involved in sexualized interactions with adults more frequently than boys in part because they were more frequently sexually solicited than boys. The prevalence rates for sexual solicitations and sexualized interactions with adults were quite similar to those obtained using a similar questionnaire in another Spanish sample (Calvete, Fernandez-González, et al., 2021).

Finally, as in previous studies (Calvete, Fernandez-González, et al., 2021), older age was also associated with a higher frequency of sexual solicitations and sexualized interactions with adults. According to a review (Wurtele, 2017), the risk of becoming targets of Internet-related sexual victimization appears to peak in early to mid-adolescence, in part because adolescents spend more time

Table 1. Correlation Coefficients between Variables, Descriptive Statistics, and Gender Differences

	1	2	3	4	5	6	10	11	12	13	14
1.T1 Sexual solicitation	1										
2. T2 Sexual solicitation	.64**	1									
3. T3 Sexual solicitation	.42**	.59**	1								
4. T1 Sexualized interaction	.61**	.49**	.38**	1							
5. T2 Sexualized interaction	.48**	.59**	.40**	.57**	1						
6. T3 Sexualized interaction	.37**	.48**	.73**	.49**	.53**	1					
10. T1 Knowledge about online grooming	.16**	.16**	.13**	.16**	.13**	.10**	1				
11. Postintervention knowledge about online grooming	.07	.11**	.08*	.04	.09*	.04	.49**	1			
12 T2 Knowledge about online grooming	.08*	.09*	.13**	.08*	.06	.14**	.53**	.54**	1		
13. T3 Knowledge about online grooming	.18**	.14**	.15**	.14**	.09*	.13**	.53**	.52**	.65**	1	
14. Age	.15**	.24**	.18**	.20**	.22**	.20**	.41**	.33**	.30**	.26**	1
Mean (total sample)	0.39	0.44	0.42	0.22	0.17	0.19	6.00	5.96	5.93	5.92	14.55
SD (total sample)	1.25	1.40	1.51	1.04	0.88	1.02	2.32	2.90	2.69	2.98	1.59
Mean (boys)	0.18	0.25	0.24	0.09	0.09	0.12	5.54	5.39	5.22	5.03	14.53
SD (boys)	0.76	0.89	1.14	0.58	0.51	0.94	2.32	2.93	2.77	3.02	1.61
Mean (girls)	0.60	0.63	0.61	0.34	0.26	0.26	6.48	6.56	6.65	6.85	14.57
SD (girls)	1.58	1.76	1.80	1.35	1.14	1.09	2.23	2.75	2.41	2.64	1.57
t for gender differences	4.75	3.77	3.46	3.44	2.68	1.83	5.70	5.95	7.50	8.80	-0.34
p for gender differences	< .001	< .001	< .001	< .001	.007	.067	< .001	< .001	< .001	< .001	.733
d for gender differences	0.34	0.27	0.25	0.25	0.19	0.13	0.41	0.41	0.55	0.64	0.02

Note. T1 = pretest; T2 = three-month follow-up; T3 = six-month follow-up.
* $p < .05$, ** $p < .001$.

Table 2. Prevalence Rates of Sexual Solicitation and Sexualized Interaction with Adults

	Total	Boys	Girls	χ^2		Cramer's V	
				Value	p	Value	p
T1 Sexual solicitation	14.5%	8.0%	21.2%	26.84	< .001	.19	< .001
T2 Sexual solicitation	15.4%	11.8%	19.1%	7.86	.007	.10	.005
T3 Sexual solicitation	12.9%	8.6%	17.3%	12.98	< .001	.13	< .001
T1 Sexualized interaction	7.2%	3.4%	11.1%	17.31	< .001	.15	< .001
T2 Sexualized interaction	6.7%	4.6%	8.8%	5.29	.015	.08	.021
T3 Sexualized interaction	6.4%	3.6%	9.3%	10.76	.001	.12	.001

Table 3. Model Testing the Effect of the Preventive Intervention on Sexualized Interactions with Adults

Fixed Effect	Coefficient	SE	t-ratio	df	p
Sexualized interactions with adults					
Intercept	-0.29	0.06	-4.76	33	< .001
Grooming Intervention	-0.01	0.01	-1.09	815	.275
Age	0.02	0.00	5.14	815	< .001
Gender (1 = female, 0 = male)	0.04	0.01	3.25	815	.001
Sexual solicitation	0.23	0.05	4.64	815	< .001
Sexual solicitation x intervention	-0.16	0.07	-2.44	815	.015
Time	-0.01	0.00	-1.80	815	.072
Time x intervention	0.00	0.00	0.23	815	.816

on the Internet and have a greater curiosity about sexuality. Thus, preventive interventions should begin early, before the peak of online sexual victimization occurs.

Table 4. Model Testing the Effect of the Preventive Intervention on Knowledge about Online Grooming.

Fixed Effect	Coefficient	SE	t-ratio	df	p
Intercept	5.83	0.23	25.75	33	< .001
Intervention	0.29	0.14	3.11	816	.036
Time	-0.91	0.17	-5.36	816	< .001
Time x intervention	1.95	0.19	10.52	816	< .001
Time²	0.28	0.06	4.95	1369	< .001
Time² x intervention	-0.61	0.07	-9.39	1369	< .001

Limitations and Strengths of the Study

This study is not without limitations, which represent challenges for future research. First, all measures were self-reported, and this may have contributed to artificially increasing the covariation between variables. It would be enriching to include other assessment methods, such as structured interviews with adolescents, to assess the variables under study. Second, in this study, information about gender was asked only in a binary manner. This does not capture the gender diversity of the adolescents. The reason for doing it this way was that we wanted the intervention and materials to be adapted in language to each gender, so in the case of girls the items in the questionnaires would be written in a feminine form while in the case of boys they would be written in a masculine form. Thus, depending on the gender selected by the adolescents, Qualtrics redirected them to the corresponding female vs. male version. All participants indicated one of the two categories, and none left this variable unanswered. We anticipated that the percentage of adolescents who would identify with a non-binary gender would be very small. Therefore, in order to simplify the procedure, we used only the binary categories. However, we acknowledge that this was a limitation and that more gender-sensitive procedures should be used in future studies. Finally, although the study included follow-ups at three and six months, it would be desirable to include even longer follow-up periods to assess the stability of the results. Despite these limitations, the study also has notable

strengths, such as the large sample of adolescents with variability in age and socioeconomic levels, the inclusion of several measures over time, and the randomization procedure of the participants to the control and experimental interventions.

Conclusion

The development of brief and low-cost interventions to prevent abusive situations in childhood and adolescence is a challenge for psychological research. The results of this study contribute to filling a gap in the prevention of online sexual abuse in adolescence. The effects of the educational intervention on online grooming are promising and add to those obtained in a few previous studies in which other brief interventions showed beneficial effects on reducing sexual interaction responses with adults when adolescents are sexually solicited on the Internet. Furthermore, as Wurtele and Alexander (2016) pointed out, while a multi-stakeholder approach is essential for defending the right of adolescents to access information using Internet-based communication tools, they also have a fundamental right to be protected from sexual exploitation, including in the virtual world. This approach should include several preventive actions, including not only educational actions focused on adolescents but also actions focused on parents, offenders, and Internet-based technology companies, to ensure that online environments are safe places.

Conflict of Interest

The authors of this article declare no conflict of interest.

References

Boustani, M. M., Frazier, S. L., & Lesperance, N. (2017). Sexual health programming for vulnerable youth: Improving knowledge, attitudes, and behaviors. *Children and Youth Services Review, 73*, 375-383. https://doi.org/10.1016/j.childyouth.2017.01.013

Broome, L. J., Izura, C., & Lorenzo-Dus, N. (2018). A systematic review of fantasy driven vs. contact driven internet-initiated sexual offences: Discrete or overlapping typologies? *Child Abuse & Neglect, 79*, 434-444. https://doi.org/10.1016/j.chiabu.2018.02.021

Calvete, E., Cortazar, N., Fernández-González, L., Echezarraga, A., Beranuy, M., León, A., González-Cabrera, J., & Orue, I. (2021). Effects of a brief preventive intervention in cyberbullying and grooming in adolescents.

Psychosocial Intervention, 30(2), 75-84. https://doi.org/10.5093/pi2020a22

Calvete, E., Fernández-González, L., Royuela-Colomer, E., Morea, A., Larrucea-Iruretagoyena, M., Machimbarrena, J. M., González-Cabrera, J., & Orue, I. (2021). Moderating factors of the association between being sexually solicited by adults and active online sexual behaviors in adolescents. *Computers in Human Behavior, 124,* Article 106935. https://doi.org/10.1016/j.chb.2021.106935

Calvete, E., Orue, I., Echezarraga, A., Cortazar, N., & Fernández-González, L. (2022). A growth mindset intervention to promote resilience against online peer victimization: A randomized controlled trial. *Computers in Human Behavior,* 135, Article 107373. https://doi.org/10.1016/j.chb.2022.107373

Chiu, J., & Quayle, E. (2022). Understanding online grooming: An interpretative phenomenological analysis of adolescents' offline meetings with adult perpetrators. *Child Abuse & Neglect, 128*, Article 105600. https://doi.org/10.1016/j.chiabu.2022.105600

Choi, H. J., Mori, C., Van Ouytsel, J., Madigan, S., & Temple, J. R. (2019). Adolescent sexting involvement over 4 years and associations with sexual activity. *Journal of Adolescent Health, 65*(6), 738-744. https://doi.org/10.1016/j.jadohealth.2019.04.026

Cooper, K., Quayle, E., Jonsson, L., & Svedin, C. G. (2016). Adolescents and self-taken sexual images: A review of the literature. *Computers in Human Behavior, 55*(part B), 706-716. https://doi.org/10.1016/j.chb.2015.10.003

Davidson, J., Martellozzo, E., & Lorenz, M. (2009). *Evaluation of CEOP ThinkUKnow internet safety programme and exploration of young people's internet safety knowledge.* Centre for Abuse & Trauma Studies and Kingston University.

De Santisteban, P., & Gómez-Guadix, M. (2017). Estrategias de persuasión en *grooming on line:* un análisis cualitativo con agresores en prisión. *Psychological Intervention, 26*(3), 139-146. https://doi.org/10.1016/j.psi.2017.02.001

Donmez, Y. E., & Soylu, N. (2020). The relationship between online sexual solicitation and internet addiction in adolescents. *Journal of Child Sexual Abuse, 29*(8), 911-923. https://doi.org/10.1080/10538712.2020.1841355

Forni, G., Pietronigro, A., Tiwana, N., Gandolfi, C. E., Del Castillo, G., Mosillo, M., & Pellai, A. (2020). Little red riding hood in the social forest. Online grooming as a public health issue: A narrative review. *Annali Di Igiene: Medicina Preventiva e Di Comunita, 32*(3), 305-318. https://doi.org/10.7416/ai.2020.2353

Gámez-Guadix, M., De Santisteban, P., & Alcazar, M. Á. (2018). The construction and psychometric properties of the questionnaire for online sexual solicitation and interaction of minors with adults. *Sexual Abuse, 30*(8), 975-991. https://doi.org/10.1177/1079063217724766

Gámez-Guadix, M., De Santisteban, P., Wachs, S., & Wright, M. (2021). Unraveling cyber sexual abuse of minors: Psychometrics properties of the Multidimensional Online Grooming Questionnaire and prevalence by sex and age. *Child Abuse & Neglect, 120,* Article 105250. https://doi.org/10.1016/j.chiabu.2021.105250

Gámez-Guadix, M., Román, F. J., Mateos, E., & De Santisteban, P. (2021). Creencias erróneas sobre el abuso sexual online de menores (child grooming) y evaluación de un programa de prevención. *Psicología Conductual, 29*(2), 283-296. https://doi.org/10.51668/bp.8321204s

Jones, L. M., Mitchell, Kimberly J., & Walsh, W. A. (2014). *A content analysis of youth internet safety programs: Are effective prevention strategies being used?* Crimes Against Children Research Center (CCRC), University of New Hampshire.

Kloess, J. A., Beech, A. R., & Harkins, L. (2014). Online child sexual exploitation: Prevalence, process, and offender characteristics. *Trauma, Violence and Abuse, 15*(2), 126-139. https://doi.org/10.1177/1524838013511543

Miu, A. S., & Yeager, D. S. (2015). Preventing symptoms of depression by teaching adolescents that people can change: Effects of a brief incremental theory of personality intervention at 9-month follow-up. *Clinical Psychological Science, 3*(5), 726-743. https://doi.org/10.1177/2167702614548317

Montiel, I. (2018). Ciberacoso sexual en adolescentes: creencias erróneas [Online sexual harassment among teenagers: Erroneous beliefs]. *Revista Iberoamericana de Psicología, 11*(3), 19-29. https://doi.org/10.33881/2027-1786.rip.11302

National Statistics Institute. (2020). *National classification of occupations.* https://www.ine.es/dyngs/INEbase/en/operacion.htm?c=Estadistica_C&cid=1254736177033&menu=ultiDatos&idp=1254735976614

Oliva, A., Antolín-Suárez, L., & Rodríguez-Meirinhos, A. (2019). Uncovering the link between self-control, age, and psychological maladjustment among Spanish adolescents and young adults. *Psychosocial Intervention, 28*(1), 49-55. https://doi.org/10.5093/pi2019a1

Quayle, E. (2020). Prevention, disruption and deterrence of online child sexual exploitation and abuse. *Era Forum, 21, 429-447.* https://doi.org/10.1007/s12027-020-00625-7

Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., Congdon, R. T., & du Toit, M. (2019). *HLM 8.0 for Windows* [Software manual]. Scientific Software International.

Ringenberg, T. R., Seigfried-Spellar, K. C., Rayz, J. M., & Rogers, M. K. (2022). A scoping review of child grooming strategies: Pre-and post-internet. *Child Abuse & Neglect, 123*, Article 105392. https://doi.org/10.1016/j.chiabu.2021.105392

Schleider, J. L., Dobias, M. L., Sung, J. Y., & Mullarkey, M. C. (2020). Future directions in single-session youth mental health interventions. *Journal of Clinical Child & Adolescent Psychology, 49*(2), 264-278. https://doi.org/10.1080/15374416.2019.1683852

Wachs, S., Whittle, H. C., Hamilton-Giachritsis, C., Wolf, K. D., Vazsonyi, A. T., & Junger, M. (2018). Correlates of mono-and dual-victims of cyber-grooming and cyberbullying: Evidence from four countries. *Cyberpsychology, Behavior and Social Networking, 21*(2), 91-98. https://doi.org/10.1089/cyber.2016.0733

Wavemaker. (2020). *Informe sobre los adolescentes* [Report on adolescents]. https://wavemakerglobal.com/es/wp-content/uploads/sites/12/2021/04/LIVE-Panel-Teenagers.pdf

Whittle, H. C., Hamilton-Giachritsis, C., & Beech, A. R. (2013). Victims' voices: The impact of online grooming and sexual abuse. *Universal Journal of Psychology, 1*(2), 59-71. https://doi.org/10.13189/ujp.2013.010206

Whittle, H., Hamilton-Giachritsis, C., Beech, A., & Collings, G. (2013). A review of online grooming: Characteristics and concerns. *Aggression and Violent Behavior, 18*(1), 62-70. https://doi.org/10.1016/j.avb.2012.09.003

Wurtele, S. K. (2017). Preventing cyber sexual solicitation of adolescents. In R. Alexander (Ed.), *Research and practices in child maltreatment prevention* (Vol. 1, pp. 361-393). STM Learning.

Wurtele, S. K., & Alexander, R. (2016). Technology-related sexual solicitation of adolescents: A review of prevention efforts. *Child Abuse Review, 25*(5), 332-344. https://doi.org/10.1002/car.2445

Ybarra, M. L., Espelage, D. L., & Mitchell, K. J. (2007). The co-occurrence of Internet harassment and unwanted sexual solicitation victimization and perpetration: Associations with psychosocial indicators. *Journal of Adolescent Health, 41*(6), 31-41. https://doi.org/10.1016/j.jadohealth.2007.09.010