Bi-directional longitudinal associations between different types of bullying victimization, suicide ideation/attempt, and depression among a large sample of European adolescents

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Background: The association between bullying victimization and depression, suicide ideation and suicide attempts has been studied mainly in cross-sectional studies. This study aims to test the bidirectional effect and the chronicity of the association versus sporadic effect of physical, verbal, and relational bullying victimization on suicidal ideation/attempts and depression. Methods: Longitudinal assessments with an interval of 3- and 12-months were performed within a sample of 2,933 adolescents (56.1% females; mean age 14.78, SD = .89) from 10 European countries, participating in the Saving and Empowering Young Lives in Europe (SEYLE) school-based multicenter control sample. Multilevel Structural Equation Models were used, controlling for sociodemographic variables. Victimization was considered chronic when a student was victimized in the first two time points and sporadic when it was reported only at one point but not in another. Results: Bidirectional prospective association between all types of victimization and depression were found. Among participants, who reported victimization once (but not twice), physical victimization, but not verbal and relational, was associated with later suicidal ideation and attempts. Chronic victimization of any type increased likelihood for later depression compared with sporadic and no-victimization. Chronic relational victimization increased the likelihood of later suicidal ideation, and chronic physical victimization increased the likelihood for suicidal attempts. Conclusions: The results support the bidirectional effect of victimization and depression and indicate that there are complex longitudinal associations between victimization and suicidal ideation/attempts. Physical victimization may especially carry effect on suicidal risk over time. Interventions should focus on victimization as a cause of distress but also aim to prevent vulnerable adolescents from becoming targets of victimization. Keywords: Bullying; victimization; prevention; suicide; suicide attempt; suicide ideation; depression; SEYLE.

Introduction
Bullying is a public health problem associated with greater risk for both mental health and behavior problems, including depression and suicidal ideation and behaviors (Centers for Disease Control and Prevention, 2017). The association between victimization by bullying and depression (Turner, Finkelhor, Shattuck, & Hamby, 2012), suicide ideation, and suicide attempts (e.g. review by Brunstein Klomek, Sourander, & Elonheimo, 2015; Meta-
Longitudinal studies have examined the impact of victimization on depression (Sweeting, Young, West, & Der, 2006; Takizawa, Maughan, & Arseneault, 2014; Zwirzynska, Wolke, & Lereya, 2012), while others have examined the impact of depression on becoming victimized (Tran, Cole, & Weiss, 2012). A few longitudinal studies have examined the bidirectional association between victimization and depression, generally indicating that there is a bidirectional association between the two (Busch, Laninga-Wijnen, van Yperen, Schrijvers, & De Leeuw, 2015; Lester, Cross, Dooley, & Shaw, 2012; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Tran et al., 2012) which may be different among genders (McMahon, Reulbach, Corcoran et al., 2010; McMahon, Reulbach, Keeley, Perry, & Arensman, 2010; Sentse, Prinzie, & Salmivalli, 2016; Tran et al., 2012). These studies indicate that depression both precedes and follows victimization. It has also been found that there is a dose effect in which the more frequent the victimization, the higher the risk for depression (e.g. Geoffroy et al., 2016).

Longitudinal studies examining the association between victimization and suicidality, however, have mainly been in a single directional pathway—how victimization leads to suicidal ideation and behavior (Brunstein Klomek et al., 2015). These studies have also indicated a dose effect (Geoffroy et al., 2016) but have examined victimization in general and did not differentiate types of victimization (Geoffroy et al., 2016). Previous studies have prospectively examined whether different forms of victimization predict subsequent suicidal ideation and behavior and evaluated different forms of victimization. However, to the best of our knowledge there is no previous longitudinal study which has examined whether suicidal adolescents are at risk for victimization nor what is the mutual association between victimization and suicidal risk. Longitudinal evidence is important to unravel the bidirectional complex associations between bullying behaviors and suicidal ideation and behavior among adolescents.

This study extends previous studies on the association between different types of victimization and suicide ideation and attempts by longitudinally investigating their mutual impact within two different time intervals (3- and 12-months) in a large representative European sample of adolescents. Specifically, the study questions are: (a) Does victimization at baseline or 3 months lead to new cases of suicide-related psychopathology (depression, suicide ideation, suicide attempts) or whether suicide-related psychopathology leads to new cases of victimization at 3 and 12 months? (b) Are chronic victims at higher risk for suicide-related psychopathology (depression, suicide ideation, suicide attempts) compared with sporadic victims and non-victims?

Methods

Data were collected as part of the Saving and Empowering Young Lives in Europe (SEYLE) study. SEYLE is a cluster randomized controlled trial (German Clinical Trials Register DRKS00000214) designed to evaluate the efficacy of school-based preventive interventions for suicidal behavior. Ten EU countries took part in the SEYLE study, including Austria, Estonia, France, Germany, Hungary, Ireland, Italy, Romania, Slovenia, and Spain, with Sweden’s National Centre for Suicide Research and Prevention of Mental Ill-Health (NASP) at Karolinska Institute serving as coordinating center. The full protocol of the study and the characteristics of the sample have previously been published (Wasserman et al., 2010). All sites had approval from a local ethics committee. Schools located within the catchment area of each study site were chosen if they fulfilled certain inclusion and exclusion criteria (Wasserman et al., 2010). After the baseline assessment (fall 2009 to spring 2010), three different interventions, which targeted the prevention of suicide attempts and suicidal ideation were carried out and were compared to a control group (Wasserman et al., 2015). Randomization into one of the four study arms was done at the school level (Carli et al., 2013; Wasserman et al., 2015). To avoid contamination and confounding, only one type of intervention was performed in each school. Follow-up data was assessed 3 and 12 months after baseline. In order to diminish the potential influence of intervention effects, the present manuscript focuses on the control group, which received a minimal intervention. The minimal intervention consisted of educational posters about mental health that were hung in the classroom for 4 weeks, as well as contact details for the local healthcare services (Wasserman et al., 2012). There were no differences between the intervention and control group participants on baseline characteristics (Wasserman et al., 2015).

Participants

The whole sample of the SEYLE-project was drawn from 168 schools, comprising a total 11,110 students. The overall number of participants was approximately 1,000 in each country with some variation between countries, and distributed equally across the study arms (Carli et al., 2013). This study included the control group which comprised 2,933 pupils at baseline assessment, 1,281 boys (43.7%), 1,647 girls (56.1%), and six who did not report their gender. In the control group number of participants ranged between 118 (Austria) and 429 (Slovenia). Two thousand four hundred and eighty three students (84.97% retention) participated at T2 (3 months) and 2,389 students (81.42% retention) were part of T3 (12 months) assessment. Mean age of the control sample during the baseline assessment was 14.78, SD = .89, range 13–18. The study included classes in which the majority of students were 15 years old (Wasserman et al., 2015).

Measures

Participants were administered a self-report survey at three-time points: baseline (T1), after 3 months (T2) and at 12 months (T3), which included several well-established questionnaires and items developed for SEYLE (Carli et al., 2013). It was conducted within the classroom. As part of a larger questionnaire, the students were asked about bullying.
Bullying longitudinal associations with suicidality

victimization, suicide attempts, suicide ideation, and depression. The primary study outcomes of interest were suicide attempts, suicide ideation and depression (lifetime and new onsets during the follow-up periods).

Bullying victimization: Assessed using 10 yes/no questions from the Global School-Based Student Health Survey (GSHS) (WHO 2009) about various types of victimization that participants reported had occurred often in the last 12 months (‘In the past 12 months have others often…’). The 3 months questionnaire referred to victimization in the past 3 months. Three variables were created indicating three different types of victimization: physical (e.g. ‘others pushed, hit or kicked you’), verbal (e.g. ‘others called you names’), and relational (e.g. ‘others spread rumors about you’). For each type of bullying a total was computed and if it was greater than one, the student was considered to be a victim of that type of bullying (Brunstein Klomek et al., 2015). Victimization was considered chronic when a student endorsed victimization (that had occurred often) at both T1 and T2 while sporadic victimization was determined when a student endorsed victimization (that had occurred often) only at T1 or T2. Any victimization includes chronic or sporadic.

Depression. Depression was assessed by the Beck Depression Inventory (BDI-II; Beck, Steer, Ball, & Ranieri, 1996). Internal reliability for this instrument was assessed through Cronbach’s alpha, which was high (BDI-II: 0.864) (Carli et al., 2013). Scores were dichotomized according to cut-off criteria (BDI-II ≥14) previously defined and established to sensitively detect at-risk students for the SEYLE study (Kaes et al., 2014).

Suicidal ideation and attempts. We used two items from the Paykel Hierarchical Suicidal Ladder (Paykel, Myers, Lindenthal, & Tanner, 1974). Pupils were identified as having suicidal ideation if they answered: ‘sometimes, often, very often or always’ to the question: ‘during the past 2 weeks, have you reached the point where you seriously considered taking your life, or perhaps made plans for how you would go about doing it?’. Pupils were identified as having a history of suicide attempt if they answered ‘yes’ to the question: ‘have you ever made an attempt to take your own life?’ (Wasserman et al., 2015). All new cases (i.e. incident cases) of suicide ideation and suicide attempt(s) were identified at either the 3 month or 12 month follow-up (Wasserman et al., 2015).

Data analysis
To examine whether victimization (physical, verbal, relational) reported once at baseline and 3-months lead to depression, suicide ideation and suicide attempts at 3 – and 12 months (respectively) or whether depression, suicide ideation and attempts at baseline and 3 months lead to new cases of victimization at 3- and 12 months (hypothesis 1), we conducted a series of multilevel autoregressive cross-lagged models (ARCL; Anderson, 1960). In these models, associations were analyzed from one time point to the next (i.e. baseline to 3-months, 3-months to 12-months). Multilevel models were selected because adolescents were nested within schools. In addition, analyses for partitioning of the variance between person- and school-level revealed significant variance between schools in victimization (physical (χ²(3) = 94.92, p < .0001), verbal (χ²(3) = 58.31, p < .004), relational (χ²(3) = 60.86, p < .002]), depression (χ²(3) = 48.75, p < .038), and suicide attempts (marginally significant at T2, χ²(3) = 44.62, p = .085, and significant at T1 and T3, χ²(3) = 48.32, p < .04) at all time points. (no significant variance was found in suicide ideation between schools, χ²(3) = 42.10, p = .13). In ARCL models, bidirectional effects of two constructs are estimated over time (baseline, 3 months, 12 months), such that a change in one construct is predicted by a second construct. Gender, age, whether the adolescent was living without his biological parents (yes, no), whether the adolescent is an immigrant (yes, no), and whether the adolescent’s parents lost their job during the last 12 months (yes, no) were included as covariates to account for their effects (Wasserman et al., 2015). In the models predicting suicide ideation and/or suicide attempts, we also included depression as a covariate. To estimate the ARCLs, we used MPLus 6.1 (Muthén & Muthén, 1998–2010) Structural Equation Modeling (SEM) software, which allows the inclusion of dichotomous variables as predictors and as outcome measures (all our main variables were dichotomous) and the use of a logit link with Monte Carlo integration. Missing data (<1% missing for each individual characteristic) were handled with the multiple imputation procedure (MI; Rubin, 2009). To examine whether chronic victims (baseline + 3 months) at higher risk for suicide-related psychopathology (depression, suicide ideation, suicide attempts) at 12 months compared with sporadic victims (baseline or 3 months) and nonvictims (not victims at baseline and at 3 months) (hypothesis 2), we conducted a series of multilevel logistic regression analyses. In these analyses, change in suicide attempts, suicide ideation, and depression served as the binary outcome measures (yes, no), victimization status as predictors, and gender, age, whether the adolescent was living without his biological parents (yes, no), whether the adolescent is an immigrant (yes, no), and whether the adolescent’s parents lost their job during the last 12 months (yes no) as covariates. In the models predicting suicide attempts and ideation, depression also served as a covariate. In multilevel models with categorical measures and maximum likelihood estimators, traditional fit statistics (e.g. Chi square, CLI, RMSEA) are not available and therefore are not reported (Muthén & Muthén, 1998–2010).

Results
Table 1 summarizes the frequencies of any physical victimization, verbal victimization and relational victimization, depression, suicide ideation, and suicide attempts in the three time points.

As for the first hypothesis, odd ratios are noted in the text. Models for the ARCL models are presented in Figure S1. Regarding depression, the ARCLs indicated that suffering from any type of victimization (physical, verbal, and/or relational) as reported once at baseline or 3 months led to new cases of depression at 3 months and 12 months, respectively. Specifically, adolescents who suffered from physical victimization at baseline were 2.24 times more likely to suffer from depression at 3 months (p < .001), and

<table>
<thead>
<tr>
<th>Table 1 Frequencies of study variables in the three-time points</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Baseline (Time 1))</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>Any Physical victimization</td>
</tr>
<tr>
<td>Any Verbal victimization</td>
</tr>
<tr>
<td>Any Relational victimization</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Suicide ideation</td>
</tr>
<tr>
<td>Suicide attempts</td>
</tr>
<tr>
<td>Any victimization—sporadic or chronic.</td>
</tr>
</tbody>
</table>

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2.26 times more likely to suffer from depression at 12 months \((p < .001)\); adolescents who suffered from verbal victimization were 1.84 times more likely to suffer from depression at 3 months \((p < .001)\), and 1.64 times more likely to suffer from depression at 12 months \((p < .001)\); adolescents who suffered from relational victimization were 1.66 times more likely to suffer from depression at 3 months \((p < .01)\), and 1.94 times more likely to suffer from depression at 12 months \((p < .001)\).

Depression also affected the likelihood of suffering from victimization. Specifically, suffering from depression at baseline led to new cases of relational \((OR = 1.87, p < .001)\), physical \((odd ratio, OR = 1.72, p < .01)\), and verbal \((OR = 1.56, p < .01)\) victimization at 3 months, and suffering from depression at 3 months led to new cases of relational \((OR = 2.02, p < .001)\) and verbal \((OR = 1.71, p < .001)\) victimization at 12 months \((but not physical victimization)\).

The ARCLs indicated that occurrence of physical victimization at baseline and/or 3 months but not the occurrence of verbal or relational victimization, led to new cases of suicide ideation and attempts at 3 and 12 months, respectively. Specifically, adolescents who suffered from physical victimization at baseline were 2.18 times more likely to experience suicide ideation \((p < .01)\) and/or attempt suicide \((p < .05)\) at 3 months compared with those who did not suffer from physical victimization; adolescents who suffered from physical victimization at 3 months were 2.54 times more likely to experience suicide ideation at 12 months \((p < .05)\) and 4.72 times more likely to attempt suicide at that time compared with those who did not suffer from physical victimization \((p < .001)\). Suicide attempt but not ideation affected the likelihood of suffering from physical victimization \((but not verbal or relational victimization)\). Specifically, those who attempted suicide between baseline and 3 months were 2.49 times more likely to suffer from physical victimization at 12 months compared with those who did not attempt suicide at that time \((p < .01)\). These results were significant controlling for the contribution of socio-demographic factors and depression.

As for the second hypothesis, the analyses indicated that chronic physical, verbal, and relational victimization significantly increased the likelihood of experiencing depression as compared with sporadic \(\text{only for verbal and relational)}\) and no victimization \((Table 2)\). Chronic relational victimization, but not verbal or physical, significantly increased the likelihood of experiencing suicide ideation as compared with sporadic and no victimization. Conversely, chronic physical victimization, but not verbal or relational, significantly increased the likelihood of making a suicide attempt as compared with sporadic and no victimization.

**Discussion**

This study longitudinally investigated the mutual impact of bullying victimization and depression, suicidal ideation and suicide attempts in a large representative European sample of adolescents. This study has a few main findings. First, there was a bidirectional association between victimization and depression. Suffering from any type of victimization \((physical, verbal, and/or relational)\) led to new cases of later depression. Depression also affected the likelihood of suffering from victimization \(\text{excluding physical at 12 months}\). These results support previous findings indicating that victimization predicts increases in a variety of internalizing problems while psychological problems precede increased victimization over time \(\text{Kaltiala-Heino, Fröjd, & Marttunen, 2009; Reijntjes et al., 2010; Storch & Ledley, 2005}\).

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**Table 2 Regression coefficients predicting depression, suicide ideation, and suicide attempts by victimization type at 12 months follow-up**

<table>
<thead>
<tr>
<th></th>
<th>Suicide attempts (b)</th>
<th>OR</th>
<th>Suicide ideation (b)</th>
<th>OR</th>
<th>Depression (b)</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>(-0.03)</td>
<td>0.97</td>
<td>(-0.08)</td>
<td>0.92</td>
<td>(-0.12)</td>
<td>0.88</td>
</tr>
<tr>
<td>Gender</td>
<td>0.19</td>
<td>1.21</td>
<td>(-0.41)</td>
<td>0.66</td>
<td>1.05***</td>
<td>2.86</td>
</tr>
<tr>
<td>Not living with parents</td>
<td>0.57</td>
<td>1.76</td>
<td>0.23</td>
<td>1.26</td>
<td>0.42**</td>
<td>1.52</td>
</tr>
<tr>
<td>Immigrant</td>
<td>0.52</td>
<td>1.68</td>
<td>(-0.25)</td>
<td>0.78</td>
<td>(-0.38)</td>
<td>0.68</td>
</tr>
<tr>
<td>Parental unemployment</td>
<td>(-0.80^*)</td>
<td>0.45</td>
<td>0.11</td>
<td>1.12</td>
<td>(-0.38)</td>
<td>0.68</td>
</tr>
<tr>
<td>Depression at baseline</td>
<td>1.00**</td>
<td>2.71</td>
<td>2.18***</td>
<td>8.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic physical victimization (0) vs. Sporadic (1)</td>
<td>(-1.36^*)</td>
<td>0.26</td>
<td>0.13</td>
<td>1.14</td>
<td>(-0.10)</td>
<td>0.91</td>
</tr>
<tr>
<td>Chronic physical victimization (0) vs. No victimization (1)</td>
<td>(-2.05^**)</td>
<td>0.13</td>
<td>(-0.73)</td>
<td>0.48</td>
<td>(-0.82^*)</td>
<td>0.44</td>
</tr>
<tr>
<td>Chronic verbal victimization (0) vs. Sporadic (1)</td>
<td>(-0.01)</td>
<td>0.99</td>
<td>0.48</td>
<td>1.61</td>
<td>(-0.43^*)</td>
<td>0.65</td>
</tr>
<tr>
<td>Chronic verbal victimization (0) vs. No victimization (1)</td>
<td>0.67</td>
<td>1.95</td>
<td>0.56</td>
<td>1.74</td>
<td>(-0.63^*)</td>
<td>0.53</td>
</tr>
<tr>
<td>Chronic relational victimization (0) vs. Sporadic (1)</td>
<td>(-0.18)</td>
<td>0.84</td>
<td>(-0.83^*)</td>
<td>0.44</td>
<td>(-0.87^**)</td>
<td>0.42</td>
</tr>
<tr>
<td>Chronic relational victimization (0) vs. No victimization (1)</td>
<td>(-0.10)</td>
<td>0.91</td>
<td>(-0.97^*)</td>
<td>0.38</td>
<td>(-1.13^***)</td>
<td>0.32</td>
</tr>
</tbody>
</table>

\(*p < .05, **p < .01, ***p < .001. OR = odds ratio. Regression models predicting depression, suicidal ideation and attempts included the control variables (gender, age, whether the adolescent was living without his biological parents (yes, no), whether the adolescent is an immigrant (yes, no), and whether the adolescent’s parents lost their job during the last 12 months (yes no) as covariates. In the models predicting suicide attempts and ideation, depression also served as a covariate.\)
Specifically, these results indicate that a student suffering from depression might be more likely to experience peer victimization. At the same time, once victimized by peers, a student might be more likely to experience depression. These results are also in line with previous findings demonstrating a bidirectional association between bullying and psychotic symptoms (Kelleher et al., 2013). The significance of the bidirectional association between depression and victimization is important since clinicians, educators, and policy decision makers should aim to include both depression and victimization in prevention and intervention efforts among adolescents.

As for suicide ideation and attempts, the findings were more complex since they differed between the types of victimization. The occurrence of physical victimization as reported once at baseline or 3 months (but not the occurrence of verbal or relational victimization), led to new cases of suicide ideation and attempts at 3 and 12 months, respectively. In the other direction, making a suicide attempt but not experiencing ideation affected the likelihood of suffering from physical victimization (but not verbal or relational victimization). These longitudinal findings expand on our previous cross-sectional findings (Barzilay et al., 2017) which indicated that suffering from physical victimization in the previous year was associated with current and severe suicide ideation. This study therefore determines that the adverse effect of physical victimization on suicide ideation remains over time and may escalate to suicide attempts. Variances between the effects of different types of victimization on the risk of experiencing suicidal ideation and behaviors were also found in a previous study in the USA (Espelage & Holt, 2013), but were not demonstrated in other studies (e.g. Turner, Exum, Brame, & Holt, 2013). These results highlight the importance of assessing and understanding the different types of victimization. The findings that suicidal ideation and attempts seem to be mostly associated bidirectionally with physical victimization may be related to the fact that physical victimization among older adolescents may be less prevalent (Barzilay et al., 2017) and less normative (Thomas et al., 2016) compared to other types of victimization and therefore associated with more severe outcomes. Our findings are in line with those by Arango, Opperman, Gipson, and King (2016) which suggested that indirect victimization maybe more commonplace among youth, affecting risk to a lesser degree.

As for a dose effect, chronic physical, verbal, and relational victimization significantly increased the likelihood of experiencing depression as compared with sporadic (only for verbal and relational) and no victimization. Results were again more complex when suicide ideation and attempts were examined. Chronic relational victimization (but not verbal or physical) significantly increased the likelihood of experiencing suicide ideation as compared with sporadic and no victimization. Conversely, chronic physical victimization (but not verbal or relational), significantly increased the likelihood for a suicide attempt as compared with sporadic and no victimization. These findings highlighting the importance of chronic relational victimization are in line with studies indicating that chronic relational victimization often leads to social isolation and loneliness (Rudolph et al., 2014), which are often associated with suicidal ideation (Joiner, 2005). Physical victimization during adolescents may be related to painful and provocative experiences that according to the Interpersonal Theory of suicide are associated with increased capacity for self-harm involved in suicidal behaviors (Barzilay et al., 2015; Van Orden et al., 2010).

These results are in line with molecular genetic studies (Sokolowski, Wasserman, & Wasserman, 2015) indicating that suicidal behavior is complex and involves interactions between the subject’s environmental influences and biology. Physical victimization may activate underlying genetic vulnerability in certain adolescents and not in others which is important for prevention. Previous studies on dose-effect of victimization did not distinguish between different types of victimization and therefore future studies are needed to examine unique effects over time.

Conclusions

The main conclusions of this study are that there is a clear bidirectional association between victimization and depression, while there are more complex longitudinal associations between victimization and suicidal ideation/attempts. This study has strengths and limitations. The strengths of this study include a large sample, longitudinal design, appropriate statistical analyses, and assessment of different types of bullying. A major limitation of the study is the use of only self-reports. Another limitation is that other variables were not included. It could be, for example, that the bidirectionality is related to shared underlying vulnerability, for example interpersonal problems.

The clinical implications of the study are very important. The findings highlight that professionals and policy decision makers should focus on victimization as a cause of distress but also should be aware that vulnerable children and young people are likely to be the targets of victimization. Clinicians working with youth affected by victimization and/or depression should assess the underlying dynamics between the two so the therapeutic intervention can focus on it to prevent future involvement. In the school-based bullying prevention efforts (Lee, Kim, & Kim, 2015), school authorities should target all students who are victims and specifically those who are chronic victims. Physical victimization confers additional risk and should be monitored and prevented with the necessary means.
Supporting information
Additional supporting information may be found online in the Supporting Information section at the end of the article.

Figure S1. ARCL models.

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Key points
• There are known cross-sectional associations between bullying victimization and depression, suicide ideation and suicide attempts.
• This study demonstrates bidirectional prospective effects between physical, verbal, and relational victimization and depression.
• Chronic victimization of any type increased likelihood for later depression compared with sporadic and non-victimization.
• Physical victimization, but not verbal and relational, predicts later suicidal ideation and attempts and therefore confers increased risk over time.
• Interventions should both prevent victimization and prevent victimized youth from developing severe psychological distress.

References


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