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Early childhood factors associated with peer victimization trajectories from 6 to 17 years of age

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Abbreviations: QLSCD: Quebec Longitudinal Study of Child Development, OR: Odds Ratios, CI: Confidence Intervals, NIMH-DIS: National Institute of Mental Health Diagnostic Interview Schedule, CES-D: Center for Epidemiologic Studies Depression

Table of content summary: This study described four trajectories of peer victimization from 6 to 17 years of age and early childhood behaviors and family characteristics associated with them.

What's Known on This Subject: Peer victimization affects children worldwide. Few studies captured its evolution over critical periods in the development of peer relationships. Moreover, little is known about pre-existing vulnerabilities that may forecast the emergence of different developmental patterns of peer victimization.

What This Study Adds: The development of peer victimization was heterogeneous. For some children, peer victimization lasted throughout their school career; for others it was limited to the first years of primary school. Early childhood behaviors and family vulnerabilities were associated with these developmental patterns.

Contributors' Statements

Ms Oncioiu conceptualized and designed the study, carried out the data analysis, drafted and finalized the manuscript.

Dr Orri supervised, conceptualized and designed the study, participated in the data analyses, reviewed and revised the manuscript for important intellectual content.

Drs Côté and Boivin supervised, conceptualized and designed the study, designed the data collection instruments, obtained funding, coordinated and supervised data collection, and reviewed and revised the manuscript for important intellectual content.

Drs Geoffroy, Arseneault, Brendgen, Galéra and Ms Navarro reviewed and revised the manuscript for important intellectual content.

Drs Tremblay and Vitaro designed the data collection instruments, obtained funding, coordinated and supervised data collection, and reviewed and revised the manuscript for important intellectual content.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

ABSTRACT

Objectives: To describe (1) the developmental trajectories of peer victimization from 6 to 17 years of age; and (2) the early childhood behaviors and family characteristics associated with the trajectories.

Methods: We used data from 1760 children enrolled in the Quebec Longitudinal Study of Child Development, a population-based birth cohort. Participants self-reported peer victimization at ages 6, 7, 8, 10, 12, 13, 15 and 17 years. Participants' behavior and family characteristics were measured repeatedly between ages 5 months and 5 years.

Results: We identified four trajectories of peer victimization from 6 to 17 years of age: low (32.9%), moderate-emerging (29.8%), childhood-limited (26.2%) and high-chronic (11.1%). Compared to children in the low peer victimization trajectory, children in the other three trajectories were more likely to exhibit externalizing behaviors in early childhood and those in the high-chronic and moderate-emerging trajectories were more likely to be males. Paternal history of antisocial behavior was associated with moderate-emerging (OR=1.54, 95% CI=1.09-2.19) and high-chronic (OR=1.93, 95% CI=1.25-2.99) relative to low peer victimization. Living in a non-intact family in early childhood was associated with childhood-limited (OR=1.48, 95% CI=1.11-1.97) and high-chronic (OR=1.59, 95% CI=1.09-2.31) relative to low peer victimization.

Conclusion: Early childhood externalizing behaviors and family vulnerabilities were associated with the development of peer victimization. Some children entered the cascade of persistent peer victimization at the beginning of primary school. Support to these children and their families early in life should be an important component of peer victimization preventive interventions.

INTRODUCTION

Peer victimization is a public health concern worldwide.[1] It is defined as harm caused by peers acting outside of the norms of appropriate conduct.[2] Adolescents who have been exposed to persistent peer victimization are at increased risk of mental health problems, including anxiety, depression and suicidality.[3–5] However, peer victimization is a multifaceted experience, and relatively few studies have investigated its development over the life course. The identification of early behavioral and familial factors that may forecast the emergence of different patterns of peer victimization should provide information to better tailor preventive interventions.

Peer victimization is characterized by substantial individual variability in its timing, duration and intensity. A variety of patterns of stability and change have been documented across different periods from early childhood to adolescence.[3,6–19] The bulk of these studies showed that an important proportion of children (between 25% and 60%) experience moderate-level peer victimization with varying developmental patterns (i.e., increasing, decreasing trajectories).[3,6,7,11,13,15,16] Most of these studies focused on the transition from primary to secondary school.[3,11,13,15,16] However, there is evidence that the vicious cycle of peer victimization and adjustment problems may already be established in the first years of school[20–23] and possibly during the pre-school years.[7,24] To our knowledge, only two studies described the individual variations of peer victimization from the beginning of formal education throughout the high school years, capturing the critical periods in the development of peer relationships (i.e., beginning of and subsequent transitions across the cycle of mandatory education).[3,16]

School-based anti-bullying interventions have shown significant, but modest effects in reducing victimization.[25] Universal preventive interventions generally do not address pre-

existing vulnerabilities which may increase the likelihood of being target of bullying. Behavior problems before school entry (i.e., before 6 years of age) may condition subsequent peer victimization experiences. For instance, externalizing behavior problems in early childhood has been found to be one of the most important correlates of subsequent peer victimization.[7,8,20,21,24] The role of early childhood internalizing behavior is less understood, with studies showing either an increased likelihood of[8,26] or no association with [7,21,24] subsequent chronic peer victimization. Moreover, studies showed that children exposed to parents' psychopathology,[27,28] negative parenting[7,29,30] or living in a non-intact family[13] have an increased likelihood of being peer victimized, while those who benefit from warm supportive parenting are protected against peer victimization.[13,30] Despite the unique role that mothers and fathers play in children's psychosocial development[31–33], the evidence on their differential contribution to the experience of peer victimization[34] is limited.

The current investigation builds on the work of Barker et al[7] and Geoffroy et al[3] on the development of peer victimization in the Quebec Longitudinal Study of Child Development (QLSCD), by extending the follow-up period across adolescence. It complements previous work with a comprehensive analysis of the contribution of early childhood behavior, maternal and paternal mental health, parenting, family structure and socioeconomic disadvantage to distinct peer victimization developmental patterns from 6 to 17 years of age.

Thus, the aims of this paper are (1) to describe the developmental trajectories of peer victimization from 6 to 17 years of age; and (2) to identify the early childhood behavior and family characteristics associated with the identified trajectories of peer victimization.

METHOD

Participants

This study is based on the QLSCD, a population-based birth cohort which tracks the development of 2120 children born in the Canadian province of Quebec in 1997-1998 and followed up until 2015. The sample was drawn through a stratified sampling procedure based on living area and birth rate from the Quebec Master Birth Registry. All mothers giving birth after 24 weeks and not later than 42 weeks of gestation who spoke English or French were eligible. Detailed information on the QLSCD can be found elsewhere.[35] The QLSCD protocol was approved by the Quebec Statistics Institute and the Sainte-Justine Hospital Research Center ethics committees. Written informed consent was obtained from all participating families at each assessment. The person most knowledgeable about the child (the mother in 98% of the cases) provided data about the child, the family, and the broader social context at 5 months, 1½, 2½, 3½, 4½ and 5 years after birth through home interviews. The fathers (biological fathers who had contact with the child at least once a month or mother's partner living in the household) also provided information through a self-administrated questionnaire.

The analytical sample in the current study consists of 1760 children followed-up from 5 months to 17 years of age who reported their peer victimization experience at least once between 6 and 17 years: 862 boys (49.0 %) and 898 girls (51.0 %). More than half of the participants (n=1038, 59.0%), provided information about peer victimization on more than 6 waves (i.e., 7 or 8 out of 8 assessments) (Table S1, available online). Table 1 presents the characteristics of the participants included in this study.

Self-reported peer victimization from age 6 to 17 years

When the children were aged 6, 7, 8, 10, 12, 13, 15, 17 years, information on peer victimization was collected using 6 items of a modified version of the Self-report victimization scale (Supplement 1, available online).[36] Participants reported how often they experienced physical (i.e., "pushed, hit or kicked"), verbal (i.e., "called names, insulted, said mean things to you", "teased you in a mean way/made fun of you"), relational victimization (i.e., "did not let you be part of his or her group", "said bad things about you to other children") and property attacks (i.e., "forced you to give something that belonged to you/made you pay them or give them something so they would leave you alone") (responses range: 0=never, 1=once or twice, 2= more often). The wording of the items was adapted to reflect changes in the experience of victimization that could occur with age (e.g., the item "did not let me play with his or her group" used when participants were aged 6-12 years was changed to "did not let me be part of his group" when children were aged 13 years or older). At each wave, if participants answered at least 4 out of the 6 questions of the peer victimization scale, we calculated the mean of the items (range 0-2) and considered the data missing otherwise. The mean score at each wave, was rescaled (multiplied by 5) to range from 0 to 10 (with a higher score indicating a higher level of peer victimization). Cronbach α ranged from .74 to .81 across ages.

Table 2 provides the description of the measures used to assess family socio-demographic characteristics, parental mental health, parent-child relationship and children's behavior. A comprehensive list of the items used to derive the early childhood measures is available online (Table S2).

Missing data and attrition

The excluded participants were more likely to be male, of non-Canadian origins, come from socioeconomic disadvantaged families, to have a mother with higher depressive symptoms

and overprotective parents compared to participants retained in the study (Table S3, available online). Therefore, these variables were used to derive weights that were applied in all regression models using the inverse probability weighting procedure. Missing data rate was below 3.5 % for the majority of the variables with the exception of father psychopathology (13.4%) and father-child relationship (20%). To avoid loss of participants due to listwise deletion, the multivariate models were estimated using multiple imputation by chained equation (n=50 dataset).

Statistical analyses

Developmental trajectories of peer victimization

We used group-based trajectory modeling[43,44] to estimate the developmental trajectories of peer-victimization from 6 to 17 years of age. Group-based trajectory modelling, a special case of finite mixture models, identifies clusters of individuals who follow similar developmental trajectories. The best fitting model was identified by estimating models with 2 to 8 latent clusters with quadratic age terms and comparing them using the Bayesian Information Criterion (BIC) as primary index. As recommended, the size of the clusters was also considered to select the best model (no solution with small group sizes, i.e., <5% of the sample, was selected). We assessed the quality of the classification identified by the model using the average posterior probability of cluster membership (good if > .70 for each trajectory).

Association between early childhood factors and peer victimization trajectories

In a first step, we used univariate multinomial logistic regression models to estimate the association between trajectory membership and each early childhood variable separately. In a second step, to estimate the unique contribution of each variable over and above the effect of the other variables, we ran multivariate multinomial logistic regression models. We entered in the

multivariate model, all variables which showed a significant association at $p < .05$ with any of the trajectories relative to the reference trajectory in the univariate models. The trajectory with the lowest levels of peer victimization was used as reference category in all the multinomial logistic regression models.

Post hoc analyses

We performed two separate subgroup analyses to compare the high-chronic trajectory with the moderate-emerging and childhood-limited trajectories.

RESULTS

Trajectories of self-reported peer victimization from 6 to 17 years of age

We identified four distinct developmental trajectories of self-reported peer victimization from 6 to 17 years of age (Figure 1): (1) low peer victimization across the entire period (n=579, 32.9%); (2) moderate-emerging peer victimization, characterized by steady levels of victimization from age 6 to 12 years and the second highest level of victimization across adolescence (n=525, 29.8%); (3) childhood-limited peer victimization, characterized by a relatively high level of victimization at age 6, followed by a progressive sharp decline from age 6 to 17 years, and virtually no victimization at age 17 (n=461, 26.2%) and (4) high-chronic peer victimization, characterized by persistently higher levels of victimization relative to the other groups, despite a decline from age 6 to 17 years (n=195, 11.1%). The fit indices of the models with 2 to 8 trajectories that were compared to determine the optimal solution are presented in Table S4 (available online).

Early childhood factors associated with the trajectories of self-reported peer victimization

Univariate analyses showed that early childhood behavior and family characteristics were associated with peer victimization development (Table 1). Similar to the univariate analyses, in multivariate analyses we showed that compared to the children following a low trajectory of peer victimization, children in the three other trajectories were more likely to exhibit higher levels of externalizing symptoms. Additionally, children following a moderate-emerging or a high-chronic trajectory of peer victimization, compared to those in the low victimization trajectory, were more likely to be boys and have a father with a history of antisocial behavior. Finally, children following a childhood-limited or high-chronic peer victimization trajectory were more likely to come from non-intact families (Table 2).

The associations for maternal and paternal depression and parenting as well as for socioeconomic disadvantage observed in the univariate models were not statistically significant when accounting for children's behaviors and the other family characteristics in multivariate models. The level of internalizing behavior in early childhood and the maternal history of antisocial behavior were similar for children across the four peer victimization trajectories (Table 1).

Post hoc analyses

Children in the high-chronic relative to the moderate-emerging and childhood-limited trajectories were more likely to exhibit higher level of externalizing symptoms in early childhood, controlling for other behaviors and family factors. Additionally, children in the high-chronic trajectory were more likely to be males and have a father with a history of antisocial behavior compared to those in the childhood-limited trajectory and to come from a non-intact family relative to those in the moderate-emerging trajectory (Table S4 available online).

DISCUSSION

This was the largest study to describe the developmental trajectories of peer victimization from 6 to 17 years of age and to document their associations with early childhood behavior and family characteristics.

We identified four distinct peer victimization trajectories: low, moderate-emerging childhood-limited and high-chronic. While the majority of children reported some level of peer victimization at school entry, all groups except the moderate-emerging reported declining levels in middle childhood. The pattern of severity and stability of peer victimization, the relative size of the low and childhood-limited peer victimization groups and the higher proportion of males in the trajectories characterized by persistent peer victimization were findings similar to those described by Ladd et al[16] over the same ages (i.e., 6 to 17 years). Thus, the striking similarities between these two studies done in very distinct North-American cultural settings suggest that they both captured general patterns of perceived peer victimization development throughout the cycle of mandatory education. Moreover, these two studies indicate that middle childhood is a period of substantial differentiation in the development of peer victimization. That is, more than half of children exhibited a change in the rank ordering of the peer victimization group. The childhood-limited group reported the second highest level of victimization at 6 years of age and had, together with the low group, the lowest levels at 17 years of age. In contrast, the moderate-emerging group reported the second lowest levels of victimization at 6 years of age and the second highest level after the chronic group at 17 years of age. Our findings from 12 years of follow-up across childhood and adolescence strengthen the evidence about the existence of primary school limited and late-onset peer victimization which was theoretically described[8] or empirically derived[6,11] in short-term longitudinal studies.

We showed that paternal history of antisocial behavior was associated with persistent peer victimization (i.e., high-chronic and moderate-emerging trajectories) when controlling for children's sex, behavior, maternal factors, parenting, socioeconomic disadvantage and family structure. This is the first study reporting on the relationship between father's mental health and the development of peer victimization in the offspring. However, our findings are in line with evidence from studies which showed that paternal negativism[34] and hostility[45] are associated with peer victimization and bullying, respectively and with studies on the association between father's psychopathology and offspring's behavioral problems.[31,46] Furthermore, in line with Brendgen et al.,[13] we showed that living in a non-intact family was associated with high levels of peer victimization at school entry (i.e., high-chronic and childhood-limited trajectories). Father's antisocial behavior distinguished between children in these two trajectories. That is, children who escaped high levels of peer victimization in the first years of primary school had a father with better mental health than those who continued to be highly victimized during adolescence. These findings strengthen the importance of paternal mental health for high-chronic peer victimization.

A genetically informative study has shown that father's antisocial behavior may influence children's behavioral problems through both genetic and environmental pathways.[47] Twin studies indicated that genetic factors accounted for an important part of the variation in persistent peer difficulties.[8,22] Moreover, a polygenic score study showed that high genetic risk for mental health problems was associated with increased exposure to bullying.[48] Therefore, future studies are needed to clarify the association between father's mental health problems and offspring's persistent peer victimization (e.g., genetic, environmental mechanisms).

Consistent with previous research[7,8,21,24], we found that high externalizing behavior problems during the preschool years were important factors for the development of peer victimization. Children who exhibited the highest levels of externalizing behavior during early childhood endured the highest levels of peer victimization from 6 to 17 years of age. These findings, taken together with the overrepresentation of boys and fathers with history of antisocial behavior in the trajectories characterized by persistent peer victimization, echo the literature on the profile of bully/victims.[27] Similar to other studies among young children[7,21,24], we found that children in the different trajectories of peer victimization had similar internalizing symptoms prior to school entry. These findings differ from those among older children and adolescents[49], probably because internalizing symptoms become more negatively perceived by peers and associated with peer victimization as children grow older.[9]

The findings from this study need to be interpreted in the context of its limitations. First, we did not assess the power imbalance between the bully and the victim which is part of the definition of bullying. However, students' definition of bullying tends to focus on negative actions by peers and fails to include power imbalance.[50,51] Second, we did not differentiate between children who are only victimized and those who are simultaneously bullies and victims. Thus, the experiences of peer victimization described in this study also capture the experience of bully/victims. Third, we measured peer victimization using self-reports. Despite the advantages of this assessment method in long-term studies (see Ladd et al[16]), self-reported peer victimization is potentially biased by the self-system, which may be less differentiated and related to actual experiences in younger children.[22,52] Forth, 83% of the baseline sample was available for the 17-year follow up. To minimize attrition bias, analyses were conducted using weights accounting for the probability of being retained in the study at follow-up. To minimize loss of participants in

multivariate models due to listwise deletion we used imputations. Results with and without weighs and imputations were fairly similar strengthening the internal validity of the study.

These limitations notwithstanding, this is the largest and one of the longest population-based studies to have applied a longitudinal person-centered approach to repeated measure of peer victimization. The external validity of our results is reinforced by the reproduction of the peer victimization trajectories between 6 and 17 years of age described by Ladd et al[16], despite the use of a different statistical method. Moreover, this study is unique through the description of both maternal and paternal factors associated to peer victimization development.

Conclusions

In this study we identified four different developmental patterns of peer victimization across the entire cycle of mandatory education, primarily distinguished by their development during primary school. Some children experienced persistent peer victimization already in the first years in primary school. Early childhood externalizing behaviors and family vulnerabilities were associated with the development of peer victimization. To prevent persistent peer victimization, victimized children should be offered targeted interventions which address these individual and family vulnerabilities early in their school careers.

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TABLES

Table 1. Early Life Characteristics (age 5 months – 5 years) of Participants by Trajectories of Peer Victimization from 6 to17 Years of Age (N=1760)

	Overall	**Trajectories of peer victimization from 6 to 17 years of age**								
		Low (n=579)	**Moderate-emerging (n=525)**			**Childhood-limited (n=461)**			**High-chronic (n=195)**		
Characteristics	**Mean (SD) or No. (%)**	**Mean (SD) or No. (%)**	**Mean (SD) or No. (%)**	**OR**	**95% CI**	**Mean (SD) or No. (%)**	**OR**	**95% CI**	**Mean (SD) or No. (%)**	**OR**	**95% CI**
Boy	862 (49.0)	243 (42.00)	275 (52.4)	1.52	1.20-1.93[a]	228 (49.5)	1.36	1.07-1.75[b]	116 (59.5)	2.04	1.46-2.84[a]
Externalizing behavior	2.91 (1.21)	2.62 (1.15)	2.98 (1.24)	1.31	1.18-1.45[a]	3.01 (1.17)	1.33	1.19-1.48[a]	3.37 (1.22)	1.67	1.46-1.91[a]
Internalizing behavior	1.22 (0.93)	1.21 (0.95)	1.25 (0.95)	1.05	0.92-1.19	1.18 (0.92)	0.97	0.85-1.11	1.24 (0.85)	1.05	0.89-1.25
Socioeconomic status	3.99 (0.98)	3.92 (0.99)	3.97 (1.01)	1.06	0.94-1.20	4.05 (0.95)	1.15	1.01-1.30[b]	4.14 (0.91)	1.27	1.07-1.51[a]
Non-intact family	576 (32.8)	160 (27.70)	163 (31.2)	1.17	0.90-1.52	171 (37.1)	1.56	1.20-2.03[a]	82 (42.30)	1.93	1.38-2.71[a]
Maternal history of antisocial behavior	325 (19.0)	97 (17.20)	99 (19.40)	1.17	0.86-1.59	88 (19.70)	1.2	0.87-1.65	41 (21.90)	1.37	0.91-2.05
Paternal history of antisocial behavior	272 (17.8)	68 (13.10)	93 (20.60)	1.73	1.22-2.44[a]	64 (16.20)	1.26	0.87-1.83	47 (28.70)	2.62	1.71-4.02[a]

Table 1 (continued). Early Life Characteristics (age 5 months – 5 years) of Participants by Trajectories of Peer Victimization from 6 to17 Years of Age (N=1760)

	Overall	**Trajectories of peer victimization from 6 to 17 years of age**									
		Low (n=579)	**Moderate-emerging (n=525)**			**Childhood-limited (n=461)**			**High-chronic (n=195)**		
Characteristics	**Mean (SD) or No. (%)**	**Mean (SD) or No. (%)**	**Mean (SD) or No. (%)**	**OR**	**95% CI**	**Mean (SD) or No. (%)**	**OR**	**95% CI**	**Mean (SD) or No. (%)**	**OR**	**95% CI**
Maternal depressive symptoms	1.39 (1.15)	1.25 (1.07)	1.49 (1.26)	1.20	1.08-1.34[a]	1.43 (1.09)	1.15	1.03-1.29[b]	1.49 (1.18)	1.22	1.07-1.41[a]
Paternal depressive symptoms	1.06 (1.00)	0.99 (0.97)	1.11 (1.00)	1.14	1.00-1.30	1.01 (0.93)	1.02	0.89-1.17	1.27 (1.20)	1.3	1.11-1.53[a]
Mother positive parenting	6.52 (0.89)	6.56 (0.87)	6.52 (0.90)	0.94	0.82-1.08	6.48 (0.91)	0.91	0.79-1.05	6.54 (0.91)	0.98	0.82-1.18
Father positive parenting	6.08 (1.18)	6.16 (1.19)	6.00 (1.18)	0.89	0.79-0.99[b]	6.07 (1.19)	0.94	0.84-1.06	6.02 (1.15)	0.92	0.78-1.07
Mother coercive parenting	2.94 (0.99)	2.77 (0.94)	2.98 (1.05)	1.28	1.13-1.45[a]	3.02 (0.94)	1.31	1.15-1.49[a]	3.19 (1.00)	1.56	1.32-1.83[a]
Father coercive parenting	2.56 (1.03)	2.43 (1.00)	2.58 (1.03)	1.18	1.03-1.34[b]	2.62 (1.02)	1.21	1.05-1.38[a]	2.76 (1.12)	1.38	1.16-1.66[a]

[a]p < .01, [b]p < .05

Table 2. Description of the Measurement Instruments for Early Childhood Behavior and Family Characteristics (5 months – 5 years)*

Characteristics	Child age at measurement[a]	Range[b]	Internal consistency	Example of items	Instrument and references
Familial and parental factors					
Socioeconomic disadvantage	5 m, 1½, 2½, 4½, 5 y	0-8		Standardized aggregate index of 5 items relating to annual gross income, parental education level, and occupational prestige	Index computed by Statistics Canada[37]
Non-intact family status	5 m, 1½, 2½, 3½, 4½, 5 y			1= the child was living in a single-parent family or blended family, i.e., living with step siblings at minimum one time point; 0 = otherwise.	
History of antisocial behavior	5 m			5 items (mother), 4 items (father), e.g., *trouble with the police or arrested; get into fights that you had started*. Derived measure:1= engaged in 2 or more behaviors during adolescence, 0= otherwise.	Modified from NIMH-DIS [38]
Depressive symptoms	Mother:5 m, 1½y; father: 5 m	0-10	.79-.81 (mother) .74 (father)	12 items, e.g., *did not feel like eating; felt lonely; had crying spells* (0=less 1 day/week to 3= 5-7days/week).	Short version of CES-D scale[39]

Table 2 (continued). Description of the Measurement Instruments for Early Childhood Behavior and Family Characteristics (5 months – 5 years)*

Characteristics	Child age at measurement[a]	Range[b]	Internal consistency	Example of Items	Instrument and references
Familial and parental factors					
Positive parenting	Mother: 2½, 3½, 4½, 5 y; father: 3½, 4½, 5 y	0-10	.61-.63 (mother) .71-.76 (father)	5-9 items, e.g., *calmly discuss the problem; play sports activities or games together; praise the child* (0=never to 5= several times/day).	Parenting Practices Scale[40]
Coercive parenting	Mother: 2½, 3½, 4½, 5 y; father: 3½, 4½, 5 y	0-10	.67-.72 (mother) .71-.73 (father)	5-8 items, e.g., *use physical punishment, tell the child is not as good as others* (0=never to 5= several times/day).	
Child-level factors (mother-reported)					
Externalizing behavior	1½, 2½, 3½, 4½, 5 y	0-10	.77-.84	15-17 items, e.g., *hits, bites, kicks; encourages children to pick on a particular child, cannot sit still, is restless or hyperactive* (0=never to 2=often).	Preschool Behavior Questionnaire[41,42]
Internalizing behavior	1½, 2½, 3½, 4½, 5 y	0-10	.48-.67	5 items, e.g., *is nervous, is high-strung or tense; is too fearful or anxious* (0=never to 2=often).	

Note: *For variables measured repeatedly, we derived a measure across early childhood if information was available at minimally two waves. For the continuous variables, we calculated the mean of the items of each scale. The mean at each wave was rescaled to range from 0 to 10, by multiplying it with a constant (except for socioeconomic disadvantage – index computed by Statistics Canada). [a] m=months, y=years; [b] the higher the score, the more severe the symptoms or the socioeconomic disadvantage; NIMH-DIS= National Institute of Mental Health Diagnostic Interview Schedule , CES-D=Center for Epidemiologic Studies Depression.

Table 3. Association Between Early Childhood Factors and Trajectories of Peer Victimization in Multivariate Multinomial Models* (N=1760)

	Trajectories of peer victimization from 6 to 17 years of age					
	Moderate-emerging		**Childhood-limited**		**High-chronic**	
Early Childhood Factors	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Boy	1.41	1.10-1.80[a]	1.24	0.96-1.59	1.73	1.23-2.44[a]
Externalizing behavior	1.20	1.06-1.35[a]	1.19	1.05-1.35[a]	1.41	1.21-1.66[a]
Socioeconomic disadvantage	0.94	0.82-1.08	1.01	0.88-1.16	1.01	0.83-1.22
Non-intact family	1.07	0.80-1.42	1.48	1.11-1.97[a]	1.59	1.09-2.31[b]
Paternal history of antisocial behavior	1.54	1.09-2.19[b]	1.10	0.75-1.60	1.93	1.25-2.99[a]
Maternal depressive symptoms	1.12	0.99-1.25	1.04	0.92-1.18	1.01	0.87-1.18
Paternal depressive symptoms	1.05	0.91-1.20	0.96	0.83-1.11	1.14	0.96-1.36
Father positive parenting	0.92	0.82-1.04	0.97	0.86-1.10	1.00	0.84-1.18
Mother coercive parenting	1.06	0.90-1.24	1.11	0.94-1.31	1.15	0.93-1.42
Father coercive parenting	1.05	0.90-1.22	1.10	0.95-1.29	1.09	0.89-1.33

* Reference category: Low peer victimization trajectory

[a]$p < .01$, [b]$p < .05$

Figure 1. Trajectories of self-reported peer victimization from 6 to 17 years of age

Legend Blue: Low (n=579, 32.9%), Orange: Moderate-emerging (n=525, 29.8%), Green: Childhood-limited (n=461, 26.2%), Red: High-chronic (n=195, 11.1%)

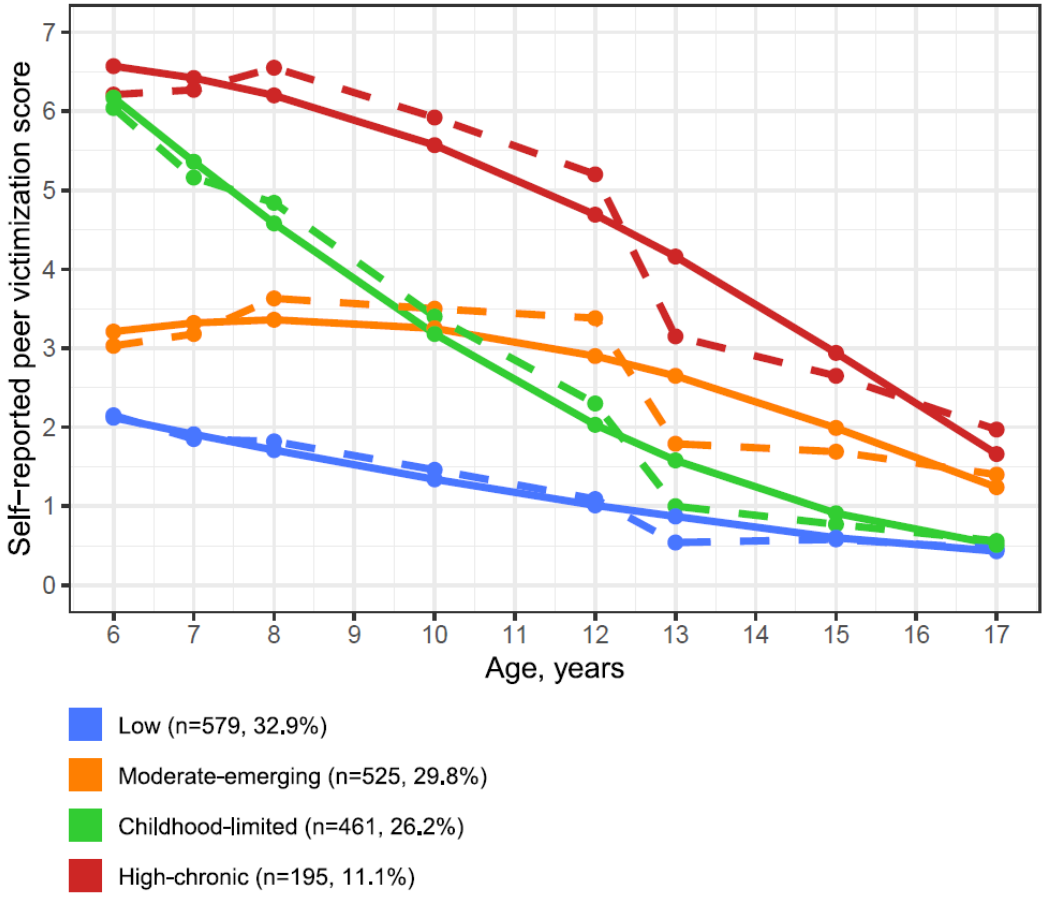

Figure 1. Footnote

Dashed lines represent trajectories for the observed values and solid lines represent trajectories as estimated by our model. To model the slope of the trajectories we used linear term for the low trajectory and quadratic terms for the other trajectories. Fit indices of the model include: Bayesian information criterion: -21168.9; entropy: median 0.75, range 0.66-0.80 (i.e., quality of the classification; adequate if >0.70) and odds of correct classification: median 7.3, range 4.7-31.7 (i.e., the model classifies the participants 7.3 times better than the classification by chance; adequate if >5.0). Please note color figures are available online.

Supplementary Materials

Supplement 1

Self-reported peer victimization items from age 6 to 17 years

The 6 items were used consistently across all 8 waves.

The wording of these items was adapted to reflect changes in the experience of victimization that could occur with age e.g., the item "did not let me play with his or her group" used when participants were 6-12 years old was changed to "did not let me be part of his group" when children were 13 years or older.

The question stated:

Since the beginning of this school year (approximately 6 months), how many times did it happen that some children at school …

(1) *pushed, hit or kicked you?* (physical peer victimization)

(2) *called you names, insulted, said mean things to you?* (verbal peer victimization)

(3) *teased you in a mean way/made fun of you, laughed at you?* (verbal peer victimization)

(4) *said bad things about you to other children?* (relational victimization)

(5) *did not let you play with/be part of his/her group?* (relational victimization)

(6) *forced you to give something that belonged to you/made you pay them or give them something so they would leave you alone?* (property attacks)

a) Never

b) Once or twice

c) More often

Table S1. Total Number of Participants According to the Number of Waves Peer Victimization was Reported

Number of waves	**Number of participants who reported peer victimization** n (%)
1	102 (5.8)
2	107 (6.1)
3	110 (6.2)
4	106 (6.0)
5	133 (7.6)
6	164 (9.3)
7	368 (20.9)
8	670 (38.1)
Total	1760 (100.0)

Table S2. Description of the Items Used to Derive the Early Childhood Behavior and Family Characteristics

Measure	Items of the scale
Mother's and father's history of antisocial behavior	(1) Did you more than once swipe things from stores or from other children, or steal from your parents or from anyone else? (2) Did you more than once get into fights that you had started? (Father: Did you often get into fights that you had started?) (3) Were you ever involved with Social Services (Department of Youth Protection), in trouble with the police or arrested because of your misbehavior? (4) Did you ever skip school at least twice in one year? (Father: Were you ever expelled or suspended from school?) (5) Did you ever run away from home overnight? **Possible response options**: Yes –coded 1 and No - coded 0
Mother's and father's depressive symptoms*	(1) I did not feel like eating, my appetite was poor (2) I feel that I could not shake off the blues even with help from my family or friends (3) I had trouble keeping my mind on what I was doing (4) I felt depressed (5) I felt that everything I did was an effort (6) I felt hopeful about the future* (7) My sleep was restless (8) I was happy. *

	(9) I felt lonely (10) I enjoyed life* (11) I had crying spells (12) I felt that people disliked me. *reversed items **Possible response options**: 0=less 1 day/week to 3= 5-7days/week
Mother's and father's positive parenting*	**Common questions asked when the child was 2½, 3½, 4½ and 5 years:** (1) How often did you and the child talk or play with each other, focusing attention on each other for five minutes or more, just for fun? (2) How often did you do something special with him that he enjoys? (3) How often did you play sports activities, hobbies or play games with him? (4) When the child broke the rules or did things that he was not supposed to, how often did you calmly discuss the problem? (5) When the child broke the rules or did things that he was not supposed to, how often did you describe alternative ways of behaving that are acceptable? *(6) Of all the times that you've talked to the child about his behavior, what proportion is praise? (question asked only at 2½ years)* **Additional questions asked when the child was 5 years old:** (1) How often did you play fight with the child just for fun?

	(2) How often did you say to your child that you were proud of him? (3) How often did you help your child doing tasks that were difficult for him? (4) How often did you comfort your child when he was sad? **Possible response options:** 0=never to 5= several times/day *Father's measures were available when the child was 3½, 4½ and 5 years old.*
Mother's and father's coercive parenting*	**Questions asked when the child was 2½ years:** (1) How often do you tell him that he is bad or not as good as other? (2) Of all the times that you talk to him about his behavior, what proportion is disapproval? (3) How often do you get angry when you punish the child? (4) How often did you think that the kind of punishment you gave him depends on your mood? (5) How often do you feel you are having problems managing him in general? (6) How often did you have to discipline him repeatedly for the same thing? (7) When the child broke the rules or did things that he was not supposed to, how often did you raise your voice, scold or yell at him?

	(8) When the child broke the rules or did things that he was not supposed to, how often did you use physical punishment? **Questions asked when the child was 3½, 4½, 5 years:** (1) How often did you get angry with the child for saying or doing something he was not supposed to? (2) How often did you hit the child when he was difficult? (3) How often do you get angry when you punish the child? (4) When the child broke the rules or did things that he was not supposed to, how often did you raise your voice, scold or yell at him? (5) When the child broke the rules or did things that he was not supposed to, how often did you use physical punishment? (6) How often did you grab firmly or shake your child when he was difficult? (asked only at 5 years) (7) How often did you have to discipline him for the same thing? (asked only at 5 years) **Possible response options**: 0=never to 5= several times/day *Father's measures were available when the child was* 3½, 4½ *and 5 years old.*
Externalizing behavior*	**At 1½, 2½, 3½, 4½, 5 years old**, **mothers rated the following items:** (1) Physically attacks others (2) Fights often with others

	(3) Hits, bites, kicks (4) Intimidates others to get what he/she wants (5) Tries to dominate other children (6) Encourages children to pick on a particular child (7) Reacts in an aggressive manner when something is taken away from him/her (8) Reacts in an aggressive manner when contradicted (9) Reacts in an aggressive manner when teased (10) When hurt by another child, gets angry and reacts by fighting (11) Cannot sit still, is restless or hyperactive (12) Is fidgety (13) Is impulsive or acts without thinking (14) Has difficulty waiting for his/her turn in games (15) Cannot settle down to do anything for more than a few moments **Possible response options:** 0=never to 2=often
Internalizing behavior*	**At 1½, 2½, 3½, 4½, 5 years old, mothers rated the following items:** **(**1) Is nervous, is high-strung or tense? (2) Is too fearful or anxious? (3) Is worried? (4) Is not as happy as other children? (5) Has trouble enjoying him/herself?

Possible response options: 0=never to 2=often

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*For these variables, we followed the standard procedure used by the Quebec Institute of Statistics (managing the data) to consider data valid (not missing). That is, if at least two thirds of the items of a scale have been answered, we calculated the mean of the items; the mean was rescaled to range from 0 to 10, by multiplying it with a constant.

Table S3. Baseline Characteristics (5-17months) of Participants and Non-participants

	Overall	**Participants**	**Non-participants**	**p-value**
N	2120	1760	360	
Boy, No. (%)	1080 (50.9)	862 (49.0)	218 (60.6)	<0.001
Birth weight, mean (SD), kg	3.40 (0.50)	3.40 (0.50)	3.41 (0.48)	0.721
Difficult temperament	2.72 (1.62)	2.71 (1.61)	2.73 (1.67)	0.835
Non-Canadian origins	765 (36.3)	594 (34.0)	171 (47.9)	<0.001
Non-intact family, No. (%)	406 (19.2)	329 (18.7)	77 (21.6)	0.246
Number of siblings				0.324
0	887 (41.8)	730 (41.5)	157 (43.6)	
1	850 (40.1)	718 (40.8)	132 (36.7)	
2 or more	383 (18.1)	312 (17.7)	71 (19.7)	
Socioeconomic disadvantage	4.01 (1.00)	3.96 (1.00)	4.23 (0.97)	<0.001
Paternal age at birth of target child, mean (SD), yr	31.84 (5.64)	31.82 (5.51)	31.96 (6.24)	0.666
Maternal age at birth of target child, mean (SD), yr	28.88 (5.23)	28.88 (5.22)	28.90 (5.28)	0.947
Maternal depressive symptoms	1.47 (1.39)	1.43 (1.37)	1.62 (1.50)	0.022
Paternal depressive symptoms, mean (SD)	1.07 (1.02)	1.06 (1.00)	1.15 (1.16)	0.188
Maternal history of antisocial behavior, No. (%)	378 (18.6)	325 (19.0)	53 (16.1)	0.242
Paternal history of antisocial behavior, No. (%)	316 (17.5)	272 (17.8)	44 (16.0)	0.536
Coercive mothering	1.07 (1.46)	1.08 (1.46)	1.01 (1.47)	0.426
Coercive fathering	1.31 (1.63)	1.32 (1.63)	1.21 (1.64)	0.304
Maternal overprotection	5.39 (2.41)	5.32 (2.42)	5.79 (2.31)	0.001
Paternal overprotection	4.14 (2.37)	4.04 (2.34)	4.69 (2.44)	<0.001

Table S4. Indices Used to Determine the Best Fitting Model Between Estimated Models with 2 to 8 Latent Clusters and Quadratic Age Term

Number of latent clusters	**Bayesian Information Criterion (BIC)***	**Size of the smallest cluster**	**Average posterior probability (APP)**	**Odds of correct classification (OCC)**
		n (%)	**Median (range)**	**Median (range)**
2	-21348.4	869 (49.4)	0.88 (0.88, 0.89)	7.6 (7.2, 8)
3	-21255.5	227 (12.9)	0.81 (0.79, 0.84)	11.9 (2.9,29.4)
4	-21171.8	203 (11.5)	0.75 (0.67, 0.80)	7.8 (4.3, 30.8)
5	-21138.1	118 (6.7)	0.74 (0.67, 0.79)	14.6 (2.9; 44.3)
6	-21120.5	91 (5.2)	0.70 (0.64, 0.77)	13.1 (3.6; 62.7)
7	-21103.3	49 (2.8)	0.67 (0.59, 0.77)	18.6 (4.0, 117.9)
8	-21103.2	57 (3.2)	0.69 (0.60, 0.76)	31.7 (2.6; 93.3)

*In group-based trajectory modelling, the BIC is always negative and the model with the value of BIC closer to 0 fits better the data (i.e., being on the negative scale, this means the higher BIC, the better the model fit).

Note: All models are based on the maximum available sample n=1760.The BIC increased sharply from the 3- to the 4-group solution and then slightly from the 5- through the 7-group solution. The 4-group solution was selected as it was conceptually meaningful (revealed distinct features of the data that were substantively relevant from a conceptual point of view) and provided the best balance between the fit indices evaluated (increased BIC, size of the smaller cluster >5% of the sample, quality of the classification, APP >.70 and odds of correct classification, classifying participants better than classification by chance, OCC>5).

Table S5. The Association Between Early Childhood Factors and Self-Reported Peer Victimization Trajectories in Multivariate Multinomial Weighted Models – Subgroup Comparisons

	High-chronic vs Childhood-limited victims (N=656)			**High-chronic versus Moderate-emerging victims (N=720)**		
	OR	**95% CI**	**p-value**	**OR**	**95% CI**	**p-value**
Boy	1.44	1.01-2.06	0.046	1.23	0.86-1.74	0.253
Externalizing behavior	1.21	1.03-1.43	0.023	1.18	1.01-1.38	0.041
Socioeconomic disadvantage	1.00	0.81-1.23	0.972	1.07	0.88-1.29	0.520
Non-intact family	1.04	0.71-1.53	0.828	1.47	1.01-2.13	0.044
Paternal history of antisocial behavior	1.82	1.16-2.87	0.01	1.25	0.82-1.92	0.302
Maternal depressive symptoms	0.97	0.82-1.15	0.728	0.92	0.79-1.06	0.240
Paternal depressive symptoms	1.17	0.98-1.41	0.088	1.09	0.91-1.29	0.355
Father positive parenting	1.02	0.86-1.21	0.841	1.08	0.90-1.29	0.401
Mother coercive parenting	1.06	0.85-1.31	0.618	1.08	0.88-1.32	0.481
Father coercive parenting	0.98	0.80-1.21	0.854	1.04	0.85-1.27	0.737