

Patterns of Poly-Victimization Among Early Adolescents: A Latent Class and Two-Wave Latent Transition Analysis

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Background: Poly-victimization involves more than just counting incidents; it varies in severity and type among adolescents and can change over time.

Objective: The aim is to identify latent classes of poly-victimization among children in early adolescence, investigate transition probabilities between these latent categories, and examine the influencing factors.

Methods: We used stratified cluster random sampling to select 2275 junior high students from five rural middle schools in Shantou and Jieyang, China, and surveyed them in two waves. Latent Class Analysis (LCA) and Latent Transition Analysis (LTA) identified latent classes of poly-victimization, and multi-factor logistic regression examined factors influencing the probability of students transitioning between these latent classes.

Results: LCA identified three categories of poly-victimization: low poly-victimization, group, and high child maltreatment and peer and sibling victimization. The probabilities of remaining in the high child maltreatment and peer and sibling victimization group, transitioning to the transition group, or shifting to the low poly-victimization group were 37.00%, 29.20%, and 33.80%, respectively. Most transition group members remained in the same group, with a conversion probability of 77.10%, followed by transitioning to the low poly-victimization group with a probability of 15.80%. Physically healthy children, compared to those with disabilities or illnesses, were less likely to switch from the low poly-victimization group to the transition group (OR=0.034) or the high child maltreatment and peer and sibling victimization group (OR=0.14). Non-left-behind children, compared to left-behind children, have a higher probability of switching from the high child maltreatment and peer and sibling victimization group to the low poly-victimization group (OR=6.905).

Conclusion: The high child maltreatment and peer and sibling victimization group had similar probabilities of transitioning into other categories. Physical illness or disability, as well as being left behind, are significant risk factors for children transitioning from the low-harm group to the high-harm group.

Keywords: poly-victimization, latent class analysis, latent transition analysis, left-behind children, child maltreatment, peer and sibling victimization

Introduction

Children and teenagers who have endured multiple forms of harm in the past year—including physical assault, property damage, child maltreatment, peer and sibling victimization, sexual harm, and both direct and indirect victimization—are described as experiencing poly-victimization (PV).¹ Finkelhor introduced this definition in 2005.² Poly-victimization not only impairs the physical and mental health of children and adolescents but also hinders their normal development and gives rise to numerous social issues. Consequences include poor mental and physical health, reduced quality of life, suicidal thoughts, post-traumatic stress disorder (PTSD), depressive symptoms, and aggressive behavior.^{3,4} Additionally,

it can lead to behavioral issues such as subpar academic performance, substance abuse, criminal activities, and re-victimization.^{5,6}

In a longitudinal study, Finkelhor assessed youngsters three times over a four-year period and discovered significant variability among those with numerous incidents of victimization.⁷ Scholars have recently explored this heterogeneity to determine if person-centered analytical techniques, such as Latent Class Analysis (LCA), can identify meaningful subclasses among individuals exposed to multiple types of victimization. LCA is a statistical method that classifies individuals based on their responses to observed factors, thus identifying group heterogeneity.⁸ Rather than just classifying based on the overall score, this strategy can group people who have similar replies into the same prospective class, minimizing the intra-class difference and maximizing the inter-class difference. It enables the calculation of the proportion of different participant types and facilitates in-depth studies or the application of various therapeutic approaches based on distinct traits. This approach has been utilized in specific cross-sectional studies focusing on sub-populations like homeless teenagers, psychiatric patients, and high-risk adolescent groups.^{9–12} Besides smaller categories such as “non-victim” and “multiple victim”, most poly-victimization studies identify a predominant “low victimization” category.^{9,13,14} Turner identified four additional categories: “family victims”, “sexual victims”, “family and school victims”, and “community victims”. Category differences are influenced by the type of victimization, sample size and characteristics, and other factors considered in the LCA. Current studies on poly-victimization offer valuable insights into the various patterns of poly-victimization and their outcomes, although they have limitations. Firstly, most LCA studies are cross-sectional, involving only a single assessment point. Consequently, they provide limited insights into the developmental patterns of poly-victimization across various childhood and adolescent stages. Moreover, previous studies, both LCA and longitudinal, employing variable-centered analysis methods, have included subjects across a wide age range, such as 2–17,⁴ 11–17,¹⁵ 13–18⁹, 7–17¹⁶, or 14–20¹⁰ years, to study poly-victimization. Although these studies categorize age ranges to preliminarily understand phenomena, they may obscure more nuanced developmental trends. This includes significant variations in the experiences of victimization, particularly during early adolescence.

These varying patterns of victimization pose distinct risks to children’s physical and mental health, which are critical for informing more effective treatment and intervention strategies. Recognizing these risks, new applications aimed at enhancing mental wellbeing can be developed to specifically address the unique challenges faced by victimized children. For instance, inspired by innovative solutions like the virtual dietitian app proposed by Garcia et al (2022) to assist adolescents, similar technology-driven interventions can be tailored to support the mental health needs of children affected by various forms of victimization.¹⁷ These applications could provide accessible and tailored support, potentially mitigating the long-term effects of victimization on children’s well-being. Little is known about the persistence and progression of poly-victimization during early adolescence, with few studies addressing the identification of distinct poly-victimization classes in this period. As the types of victimization experienced by children evolve, a developmental perspective is essential to understand these changes comprehensively. Relying solely on a poly-victimization scale to determine its presence may overlook the variances in how each type of victimization manifests across individuals. The underlying categories of poly-victimization may experience various transitions over time. Therefore, this study aims to: (1) identify the heterogeneity of poly-victimization in children, explore its latent classes among Chinese adolescents, and elucidate the patterns and developmental processes of poly-victimization; (2) employ latent transition analysis (LTA) to examine the transition probabilities of poly-victimization latent classes in children at two time points, and to analyze the factors influencing these transitions.

Methods

Sample

A stratified cluster random sampling approach was employed to select participants from a sampling frame comprising ten middle schools in Shantou City and Jieyang City, China. The selected five middle schools were chosen randomly to enhance representativeness and mitigate selection bias. The sampling was conducted from September to December 2020 (T1) and March to June 2022 (T2), on a class-by-class basis, targeting seventh and eighth graders. The survey initially included 2275 students; after discarding 184 invalid questionnaires, 2091 valid responses were retained, yielding a recovery rate of 91.91% (2091/2275). Inclusion criteria included: (1) participation in and completion of the surveys at both T1 and T2; (2) completion

of the scales in both surveys with at least a 90% completion rate. Exclusion criteria included: (1) communication and cognitive barriers; (2) failure to sign the informed consent form. All methods were performed in accordance with the relevant guidelines and regulations. This research was approved by the ethics committee of Shantou University Medical College. All the participants and their guardians agreed and provided signed, informed assent or consent on a voluntarily basis.

Measurements

Socio-Demographic Characteristics

A self-administered questionnaire was used for the socio-demographic characteristics of the students. The main components of the baseline survey (T1) included general demographic characteristics and victimization in the previous year. Data from the same research item were gathered for the second survey (T2) using the same questionnaire. (i) Personal information collected included permanent residence, gender, age, grade, class, whether left-behind children, rural household registration, self-injury intention, self-injury behavior, grade repetition, intimate partners, level of outdoor activities, class performance ranking, only-child status, and the self and peer behavioral victimization. (ii) Family background, including main caregiver, parents' marital status, education level of parents, occupation of parents, health status of parents, family economic status and bad behaviors of family members, including smoking, alcohol consumption, incarceration history of parents/caregiver.

(iii) External environment conditions, including moving within the past two years, witnessed school bullying, and unsafe incidents around the school and residence.

Poly-Victimization Among Adolescents

Child victimization was examined using the Juvenile Victimization Questionnaire-2nd Revision (JVQ-R2), which was created by Finkelhor et al.¹⁸ This scale can be used in various clinical and community settings to help record the experiences of children and adolescents. The core JVQ mainly includes 5 modules: conventional crime, child maltreatment, peer and sibling victimization, sexual victimization, witnessing and indirect victimization, with a total of 34 items. At the same time, JVQ provides supplementary modules, and researchers can choose to add corresponding supplementary modules according to the actual research conditions. In addition, based on the availability of electronic communication tools and the Internet for middle school students and the increasing rate of cyberbullying, the online victimization module (a total of 3 items) was selected in the supplementary module and added to the JVQ. Finally, the Youth Victimization Scale in this study investigated 6 modules: conventional crime, child maltreatment, peer and sibling victimization, sexual victimization, witnessing and indirect victimization, and cyberbullying, with a total of 36 items. Each item refers to a specific type of harmful event, and subjects are asked to answer whether the event described by the item occurred. This survey conducted a reliability and validity test on the scale, and the results showed that the standardized Cronbach alpha coefficient of the total score version of the victimization items in the most recent year was 0.835, and the KMO value was 0.774. According to previous relevant studies, this study defined poly-victimization as: more than 4 types of victimization occurred in the past year.

Statistical Analysis

Population and composition ratios were employed to determine the distribution of survey respondents across various subgroups of each variable, while the Chi-square test assessed the differences in the incidence of poly-victimization among groups with distinct characteristics at T1 and T2. Mplus 7.4 was used for Latent Class Analysis (LCA) and Latent Transition Analysis (LTA), and R version 4.2.1 was employed for descriptive analysis, chi-square tests, Missing Information handling, and multiple logistic regression analysis. The level of significance for hypothesis testing was set at $\alpha = 0.05$.

Results

Basic Demographic Characteristics of Research Objects

Table 1 presents the descriptive statistics of the individuals included in the study. The study included 2091 participants, with 988 males (47.25%) and 1103 females (52.75%) comprising the total sample population. The sample included 686

Table 1 Distribution of Basic Characteristics of Respondents

Variables	Characteristic	Number (n=2091)	Composition Ratio (%)
Grade	Seventh grade	1077	51.51
	Eighth grade	1014	48.49
City	Shantou City	1489	71.21
	Jieyang City	602	28.79
Gender	Girl	1103	52.75
	Boy	988	47.25
Residence	Countryside	1864	89.14
	Township	52	2.49
	Island	175	8.37
Left-behind children	No	1405	67.19
	Yes	686	32.81
Age (X±SD)		13.508	0.882

left-behind children, representing 32.81% of the total; 1489 participants were from Shantou City and 602 from Jieyang City. There were 1077 seventh graders, making up 51.51% of the total participants. The distribution of grades was uniform, and the average age of participants was 13.51 years (SD = 0.882).

Current Status and Changes of Various Victimization at T1 and T2 Time Points

[Supplementary Table 1](#) outlines the number and proportion of victimization types among respondents at T1 and T2 time points. The average number of victimization types decreased from 1.52 at T1 to 1.28 at T2. At the T1 time point, 42.34% (885/2091) of the children reported experiencing at least one type of victimization in the past year; of these, 338 met the criteria for poly-victimization, yielding an incidence rate of 16.16%. At the T2 time point, 37.54% (785/2091) of the children reported experiencing at least one type of victimization in the past year; of these, 354 met the criteria for poly-victimization, marking an incidence rate of 16.93%. Although the incidence of poly-victimization increased from T1 to T2, the difference was not statistically significant. The incidence of children experiencing three types of victimization increased, whereas the incidence among those with one or two types decreased.

Refer to [Table 2](#) for the prevalence rates of various types of victimization from time point T1 to T2. The incidence rates of each victimization type at T1 and T2 are as follows: conventional crime (26.69% vs 19.94%), direct witnessing/indirect victimization (23.05% vs 20.95%), peer and sibling victimization (6.17% vs 15.11%), child maltreatment (12.82% vs 9.13%), cyberbullying (8.51% vs 9.76%), and sexual victimization (3.16% vs 5.55%).

Analysis of Latent Class of Poly-Victimization

Number of Latent Classes

[Supplementary Table 2](#) presents the model fitting results for categories 2 through 6 in the LCA analysis at T1 and T2 time points. At T1, with three latent classes, the BIC indicator was the smallest. Although the BLRT of the four-class model was significant, indicating it is superior to the three-class model, the smallest category probability for the four-class model was less than 5%, and the Entropy value for the three-class model exceeded 8. Therefore, the best model at the T1 time point was the three-category model. At T2, the smallest values for AIC, BIC, and aBIC occurred in categories 6, 3, and 4, respectively. The aLMR test for the five-class model was not significant, indicating a poor fit, and its Entropy value was lower than that of the four-class model, suggesting the latter was superior. However, the three-class model had the smallest BIC index, and an acceptable Entropy value of 0.788. Consequently, the three-class model was determined to be the best for both T1 and T2 time points.

Table 2 Prevalence of Each Type of Poly-Victimization at Time Points T1 and T2

Types of poly-victimization	Point in time		P
	T1	T2	
Conventional crime			
No	1533 (73.31)	1674 (80.06)	<0.0001**
Yes	558 (26.69)	417 (19.94)	
Child maltreatment			
No	1823 (87.18)	1900 (90.87)	0.000**
Yes	268 (12.82)	191 (9.13)	
Peer and sibling victimization			
No	1962 (93.83)	1775 (84.89)	<0.0001**
Yes	129 (6.17)	316 (15.11)	
Sexual victimization			
No	2025 (96.84)	1975 (94.45)	0.000**
Yes	66 (3.16)	116 (5.55)	
Direct witnessing/indirect victimization			
No	1609 (76.95)	1653 (79.05)	0.109
Yes	482 (23.05)	438 (20.95)	
Cyberbullying			
No	1913 (91.49)	1887 (90.24)	0.180
Yes	178 (8.51)	204 (9.76)	

Note: **p<0.01.

Latent Class Features and Naming

Conditional probabilities for different latent classes at T1 and T2 are detailed in [Supplementary Tables 3 and 4](#), with line charts presented in [Figures 1 and 2](#). The overall conditional probability levels for each latent class of children’s poly-victimization were similar at both T1 and T2 time points. In the first category, the overall conditional probabilities for each victimization type were low, with all six victimization types registering probabilities below 5.0% at both time

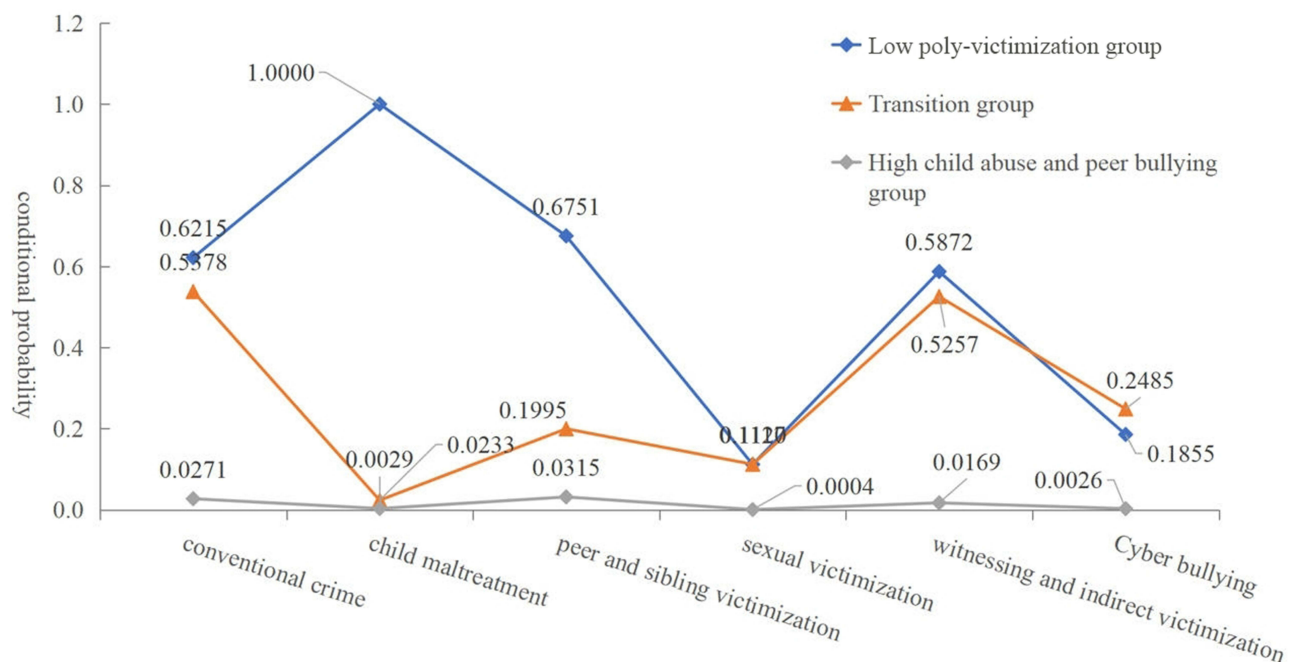


Figure 1 Line chart of conditional probability of latent class of different victimization types at T1 time point.

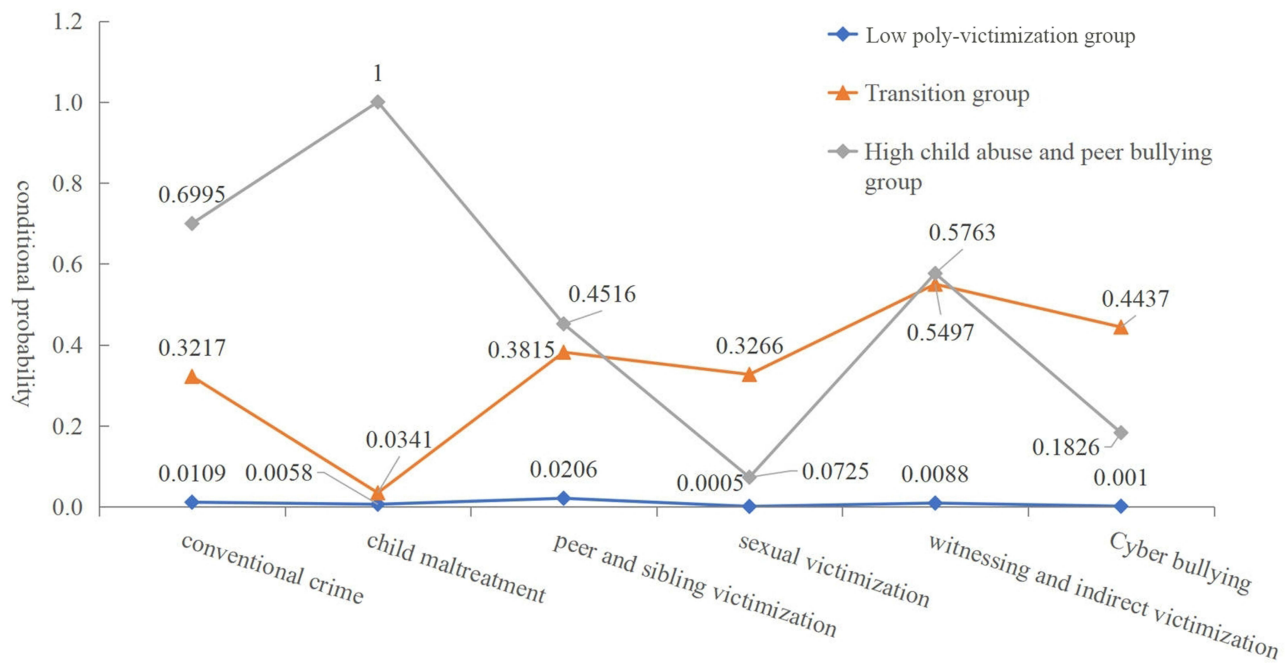


Figure 2 Line chart of conditional probability of latent class of different victimization types at T2 time point.

points. In the second category, conditional probabilities for “child maltreatment” and “peer and sibling victimization” were 2.33% and 19.95%, respectively, lower than those in the third category, where probabilities for the remaining four victimization types were equivalent. The third category displayed the highest conditional probabilities for child maltreatment and peer and sibling victimization, at 100.0% and 67.51%, respectively. Compared with T1, the conditional probabilities in the third category at T2 remained similar. In the second category, probabilities for “peer and sibling victimization”, “sexual victimization”, and “cyber victimization” increased, with “sexual victimization” and “cyber victimization” exceeding those in the third category, while “general harm” decreased. Based on conditional probability levels and characteristics, the categories were named as follows: low poly-victimization group, transition group, and high child maltreatment and peer and sibling victimization group.

The distribution of latent classes and their corresponding poly-victimization incidence rates at T1 and T2 are detailed in Table 3. At T1, the low poly-victimization group comprised the largest segment with 1328 individuals, representing 63.51% of the total; the transition group, slightly larger than the high child maltreatment and peer and sibling

Table 3 Distribution of Poly-Victimization Latent Class and Incidence of Poly-Victimization Among Respondents at T1 and T2 Time Points

Point in Time	Latent Class	n	(%)	Incidence of Poly-victimization (%)
T1	Low poly-victimization group	1328	63.51	0.38
	Transition groups	495	23.67	33.94
	High child maltreatment and peer and sibling victimization group	268	12.82	61.57
T2	Low poly-victimization group	1405	67.19	0.07
	Transition groups	499	23.86	46.49
	High child maltreatment and peer and sibling victimization group	187	8.95	64.71

victimization group, included 495 individuals, or 23.67%; the smallest was the high child maltreatment and peer and sibling victimization group with 268 individuals, representing 12.82%. At T2, the low poly-victimization group remained the largest with 1405 individuals, accounting for 67.19%; followed by the transition group with 499 individuals or 23.86%; and the high child maltreatment and peer and sibling victimization group was the smallest with 187 individuals, accounting for 8.95%. Compared to T1, the number of individuals in the high child maltreatment and peer and sibling victimization group at T2 decreased by 3.95%, while the low poly-victimization group increased by 3.68%. At T1, the incidence rates of poly-victimization were 0.38% for the low poly-victimization group, 33.94% for the transition group, and 61.57% for the high child maltreatment and peer and sibling victimization group, respectively. At T2, the incidence rates of poly-victimization were 0.07% for the low poly-victimization group, 46.49% for the transition group, and 64.71% for the high child maltreatment and peer and sibling victimization group, respectively. Compared to T1, the incidence of poly-victimization at T2 increased by 12.55% in the transition group and by 3.14% in the high child maltreatment and peer and sibling victimization group.

Analysis of Potential Conversion Probability and Influencing Factors of Poly-Victimization

Latent Class Conversion Probability of Children with Poly-Victimization

The results of the latent class conversion probability analysis for poly-victimization in children are presented in Table 4. At T1, the low poly-victimization group had a 92.60% probability of remaining in the original category by T2; the transition group followed, with a 77.10% probability of maintaining the original category; for the high child maltreatment and peer and sibling victimization group, the probabilities were more balanced across three types of transitions at T2: 37.00%, 29.2%, and 38.80% respectively. From the perspective of poly-victimization latent class transitions, the high child maltreatment and peer and sibling victimization group is most likely to remain stable over time, with a 37.00% probability of remaining the same, followed by transitioning to the transition group and the low poly-victimization group, with probabilities of 29.2% and 33.8%, respectively; the transition group had the highest likelihood of reverting to its original status, at 77.1%, with a 15.80% probability of converting to the low poly-victimization group; the low poly-victimization group was most likely to remain unchanged, with a 4.80% probability of transitioning to the transition group, which was higher than the 2.70% probability of converting to the high child maltreatment and peer and sibling victimization group.

Influencing Factors of Potential Conversion of Children with Poly-Victimization

The occurrence ratios of conversion probabilities of poly-victimization latent classes for different demographic characteristics and variables are shown in Table 5. For gender, compared to boys, girls in the low poly-victimization group were less likely to transition into the transition group (OR=0.374, P<0.05) or the high child maltreatment and peer and sibling victimization group (OR=0.297, P<0.05). Compared with left-behind children, the non-left-behind children in the high child maltreatment and peer and sibling victimization group had a higher probability of switching to the low poly-

Table 4 T1 to T2 Probability of Poly-Victimization Latent Class Transition for Respondents at Time Points

T1	T2		
	High Child Maltreatment and Peer and Sibling Victimization Group	Transition Groups	Low Multi-Damage Group
High child maltreatment and peer and sibling victimization group	0.37	0.292	0.338
Transition groups	0.072	0.771	0.158
Low multi-damage group	0.027	0.048	0.926

Table 5 Probability of Occurrence (OR) of Poly-Victimization in Children with Different Characteristics

Variables	T1 Latent Status	T2 Latent Status			
		Low Poly-Victimization Group	Transition Groups	High Child Maltreatment and Peer and Sibling Victimization Group	
Non-left-behind children (based on left-behind reference)	C1	REF	0.75	0.675	
	C2	0.873	REF	0.568	
	C3	6.905*	1.931	REF	
Girls (based on boys)	C1	REF	0.374*	0.297*	
	C2	1.063	REF	1.56	
	C3	0.552	0.875	REF	
Good health (based on physical illness or disability)	C1	REF	0.034*	0.140*	
	C2	6.4	REF	0.203*	
	C3	13.267	0.015*	REF	
Economic conditions (Based on the economic situation of wealth)					
	Poor	C1	REF	0.266	0.496
		C2	0.266	REF	0.226*
Fairly well-off		C3	0.030*	0.025*	REF
		C1	REF	0.502	0.675
		C2	0.806	REF	0.304
	C3	0.086	0.016*	REF	

Notes: The latent class C1-C3 at T1 time point correspond to the low poly-victimization group, transition group, high child maltreatment and peer and sibling victimization group, *: $P < 0.05$.

victimization group (OR=6.905, $P < 0.05$); Physically healthy children had a lower likelihood of transitioning to the transition group (OR=0.034, $P < 0.05$) or the high child maltreatment and peer and sibling victimization group (OR=0.14, $P < 0.05$). Children who do not drink alcohol in the high child maltreatment and peer and sibling victimization group were less likely to switch to the transition group compared to those who drink alcohol (OR=0.047, $P < 0.05$). Children from poor families were less likely to switch to the high child maltreatment and peer and sibling victimization group (OR=0.226, $P < 0.05$), and those within this group had lower chances of transitioning to the low poly-victimization or the transition group compared to children from wealthy families (OR=0.03, $P < 0.05$; OR=0.025, $P < 0.05$); Children from well-off families in the high child maltreatment and peer and sibling victimization group were more likely to switch to the transition group than those from wealthy families (OR=0.016, $P < 0.05$).

Discussion

Incidence and Influencing Factors of Poly-Victimization in Children

The results of this study indicate that left-behind children constitute 32.81%, and nearly one-third of them lack emotional support and supervision from their parents. The findings reveal that the incidence of poly-victimization among children in 2021 and 2022 was 16.16% and 16.92%, respectively, higher than the 10% reported by Chan's large-scale study across six cities in China.¹⁹ The incidence was, however, lower than the 19% reported in a survey of adolescents in Norway.²⁰ It is suggested that the occurrence of poly-victimization in children may be linked to regional economic, social, and cultural factors. However, differences between various regions and groups of children are influenced not only by the factors

mentioned but also by the measurement tools and assessment criteria used for poly-victimization. Furthermore, the study sample size and respondent characteristics can also influence the results. Thus, comparing poly-victimization incidence between studies is challenging. To compare the incidence of poly-victimization among different groups of children, consistent measurement tools and diagnostic criteria are required. Nevertheless, these studies have demonstrated that the high incidence of victimization is a significant phenomenon affecting the development of all children and adolescents, including both left-behind and non-left-behind children.

Among the six victimization categories, those with higher incidence rates among respondents in 2021 were conventional crime, direct witnessing/indirect victimization, and child maltreatment. The categories of victimization with higher incidence rates among respondents in 2022 were conventional crime, direct witnessing/indirect victimization, and peer and sibling victimization. Compared to 2021, respondents in 2022 were more likely to experience peer and sibling victimization and sexual victimization. The incidence of victimization and cyberbullying increased, whereas the rates of conventional crime, child maltreatment, and direct witnessing/indirect victimization declined. This suggests that when some students are in junior high school and lack parental supervision, peer and sibling victimization may increase, whereas child maltreatment may decrease. The study results indicate that peer verbal abuse and peer dating violence tend to increase under the category of peer and sibling victimization.

The decrease in physical aggression and victimization from peers may be linked to increased contact with the opposite sex in school and positive perceptions of them during adolescence. Conventional crime occurs more frequently among children and adolescents. This study reveals that the incidence rates of theft, deliberate damage to items, and physical attacks without weapons in the conventional crime category are elevated at both time points. Among these, the incidence rates of theft and deliberate damage to items are particularly high. The rates are higher than those found in a US survey, which reported that 7.8% of items were stolen and 7.4% were deliberately damaged in the past year.²¹ Conventional crime often represents a form of victimization that is easily overlooked. For instance, when adults experience property victimization (theft, robbery, or damage), it often receives attention, while property victimization involving children and adolescents is frequently overlooked. In recent years, witnessing intimate partner violence has been identified as a more concealed and less detectable form of childhood harm. UNICEF reports that approximately 275 million children worldwide have witnessed intimate partner violence.²² This study reveals that 9.24% of children in 2021 and 6.03% in 2022 witnessed partner violence in the past year. In contrast to the situation in Hong Kong, where 26% of children have witnessed physical violence between their parents, the rates observed in this study are lower.²³

Analysis of Latent Class of Poly-Victimization in Children

This study targeted junior high school students in China as the survey group and utilized LCA to investigate the heterogeneous subgroups of poly-victimization among seventh and eighth-grade students. The first to third categories were termed as the low poly-victimization group, the transition group, and the high child maltreatment and peer/sibling victimization group.

Studies targeting varying age groups and populations with different characteristics reported differences in the underlying categories of poly-victimization. Kretschmar examined poly-victimization patterns in at-risk youth and identified three victimization categories: low victimization, peer and physical assault, and high violence exposure.¹² A national study identifying the latent classes of interpersonal victimization among Latino adolescents found six categories: poly-victimization, psychological dating violence victimization, peer psychological victimization, peer physical victimization, family member physical violence victimization, and a non-involvement group.²⁴ Cho S utilized a nationally representative sample (grades 4–12) in Korea and identified four distinct subgroups: low-risk/non-victims, multiple victims, verbal bullying victims, and victims of parental abuse.²⁵ Latent class results for childhood poly-victimization may vary due to the types of poly-victimization reported by respondents. Currently, research on the heterogeneity of poly-victimization in children has yet to establish a comprehensive theory. Since measurement scales, definitions of poly-victimization, varying age groups, and regional populations all affect the results, these findings may only be applicable to respondents within this specific region and age group.

This study reveals that there are three latent classes of poly-victimization among children in China. The conditional probabilities of each victimization type in the low poly-victimization group are relatively low, but the conditional

probability of “conventional crime” is higher than other types, highlighting the need to address general harm to children. The incidence of poly-victimization among children in the low poly-victimization group was less than 2% at both T1 and T2 time points, suggesting that latent class classification results align with victimization type measures and are suitable for identifying lower levels of victimization.

At the T1 time point, the characteristics of the high child maltreatment and peer/sibling victimization group are evident due to their high conditional probabilities of child maltreatment and peer/sibling victimization, whereas the transition group is marked by low conditional probabilities for these forms of harm. The two groups exhibited similar overall conditional probability levels for other victimization types. At the T1 time point, the incidence rates of poly-victimization in the two groups were 33.94% and 61.59%, respectively. At the T2 time point, the high child maltreatment and peer/sibling victimization group maintained a level similar to T1, while the transition group exhibited increased conditional probabilities for “peer and sibling victimization”, “sexual victimization”, and “cyber victimization”. However, the conditional probability of “general harm” declined. At the T2 time point, the incidence rates of poly-victimization in the two groups were 46.49% and 64.71%, respectively. Compared to T1, the incidence of poly-victimization at T2 increased by 12.55% and 3.14% in the transition group and high child maltreatment and peer/sibling victimization group, respectively.

The results of this study suggest that relying solely on victimization occurrence to determine key intervention targets for preventing and controlling poly-victimization in the community may be limited. Some children transitioning to severe poly-victimization may not be identified. For instance, our research identified that these transitional children have a higher risk of sexual victimization and peer/sibling victimization. Therefore, to identify high-risk groups, it is crucial to detect such children early and classify them accurately so that interventions can occur sooner.

Analysis of Potential Conversion of Poly-Victimization in Children and Influencing Factors

Some current analyses of potential transformations of harm focus on specific forms, such as peer/sibling victimization,^{26,27} teen dating violence²⁸, cyberbullying²⁹, child maltreatment and neglect³⁰ and parental and community violence.³¹ Several longitudinal studies have revealed dynamic changes in victimization types over time. The progression of victimization can be classified into low-victimization groups and other varying levels of victimization.

This stability remains relatively constant over time. Regarding the stability of victimization development, both the low poly-victimization and transition groups in this study tended to remain in their original categories. In particular, the low childhood victimization group had a 92.6% probability of staying in the same latent category. The high child maltreatment and peer/sibling victimization group has the lowest likelihood of transitioning to a lower victimization status over time. When transitions occur, members primarily remain in their original group, and the probabilities of shifting to the transition group or low poly-victimization group are similar. It is suggested that the high child maltreatment and peer/sibling victimization group has a higher likelihood of experiencing ongoing harm and an elevated risk of poly-victimization. As primary school advances, children develop socially, emotionally, and cognitively, spending less time under caregiver supervision at home and more time with peers at school. According to the developmental theory of victimology and poly-victimization, this shift in structure results in a heightened risk of poly-victimization.³²

This theory promotes the concept of “transmissibility of risk”, which posits that children and adolescents who experience parental abuse are more susceptible to abuse by peers and others throughout their lives compared to those who are not victimized.^{7,32} This is because they are thought to lack the necessary social and emotional skills to form friendships and engage in prosocial interactions with peers. Consequently, they are more prone to experiencing peer rejection and victimization.³³ Based on this theory, the high childhood maltreatment and peer/sibling victimization group would likely continue experiencing poly-victimization over time, starting at home and then extending to peers and others at school and in the community. However, patterns of parental maltreatment may not consistently persist across all poly-victimized children and adolescents. Thus, the high child maltreatment and peer/sibling victimization groups were the least stable, equally likely to move to other groups. The probability of the transition group converting to the high child maltreatment and peer/sibling victimization group is 7.20%, while the likelihood of staying in the original group is

77.10%, which is higher than converting to the other two groups. This suggests a partial probability of progressing into a high poly-victimization state. One group has low levels of child maltreatment and peer/sibling victimization but moderate levels of other harm, making them likely to continue causing harm and struggle to transition to lower levels. Therefore, early identification and intervention are necessary for victimized children who are at risk of further victimization.

This study indicates that various demographic characteristics differentially influence the potential transition probabilities of poly-victimization. Among these characteristics, physical condition and different regions are associated with all latent class transition probabilities. Physical condition plays a crucial role in influencing poly-victimization among children. This may be attributed to the vulnerability exhibited by children with poor physical health. Students with physical illnesses or disabilities are more likely to face rejection and bullying from peers, may miss classes, and refrain from participating in group activities due to their health. This can lead to an increased sense of isolation. Significant differences exist in the conversion probabilities among various victimization categories for children in different cities, potentially due to disparities in sample size distribution. The study also reveals regional differences in the occurrence of victimization, which could be linked to varying local education and economic levels. Economic difficulties,³⁴ inadequate childcare,²¹ low-quality schools, and insufficient supervision due to rural parent migration may contribute to this geographic disparity. This implies that although the two cities are adjacent and share a similar cultural context, the occurrence of victimization can vary, necessitating accurate and comprehensive assessment of child victimization types based on local conditions.

This study indicates that children from poor families in the high child maltreatment and peer/sibling victimization group have a lower likelihood of transitioning to the low child poly-victimization or transition groups compared to children from affluent families. Children from well-off families in the bullying group also have a reduced probability of transitioning to the transition group. This demonstrates that the lower a family's economic status, the less likely they are to transition from high-level to low-level harm. Previous research indicates that individuals with lower family income, disabilities, or illnesses are more likely to report poly-victimization across multiple developmental stages.³⁵ Family poverty may elevate the risk of harm both within families and in communities.

Financial difficulties often increase parental stress, which can lead to marital or parental relationship breakdown and harsh or neglectful parenting.³⁶ Poverty can also force children to live in chaotic environments, such as neighborhoods with disorder and violence.³⁷ Children from low-income families often face higher levels of instability, which adversely affects their social-emotional adjustment.³⁸ Many studies recognize poverty as a significant risk factor for childhood victimization. A significant body of literature shows that children living in low-income families and impoverished environments are more likely to experience abuse, violence, and crime.

Some studies have found a strong social gradient in children's socioeconomic status, with child maltreatment increasing as the poverty rate rises in their local area.³⁹ Simultaneously, low-income and disorganized communities also place children at higher risk of violence and abuse.^{40,41} Disparities in family affluence among children and adolescents heighten the likelihood of bullying at school.^{42,43} Compared to children with alcoholic family members, those in the low poly-victim group with non-alcoholic family members were less likely to move to the transition group or high child maltreatment and peer/sibling victimization group. This suggests that family member alcoholism may increase domestic violence and undermine family relationships. Tension, or even family breakdown, keeps children in a stressful atmosphere that perpetuates harm and makes it difficult to transition to low-level harm. Consistent with previous studies, factors like not living with parents, chaotic family environments, and tense family relationships are all linked to the occurrence of poly-victimization.⁷

The research highlights the intricate dynamics of poly-victimization among children, particularly left-behind children, underscoring the urgent need for nuanced policy and practice interventions. The study's findings reveal a persistently high incidence of poly-victimization, influenced by factors like lack of parental supervision, regional disparities, and socioeconomic status. These insights necessitate targeted policy interventions to bolster child protection systems, particularly in regions identified as high-risk. Implementing consistent measurement tools and criteria for diagnosing poly-victimization is critical to ensure accurate identification and intervention. For practical application, enhancing support structures at both school and community levels is crucial. Schools should integrate robust peer relationship

management and anti-bullying programs tailored to the needs of vulnerable groups, such as left-behind children. Community interventions should focus on raising awareness about the signs of various victimization forms and establishing more comprehensive support services for affected children. Additionally, educational programs should be implemented in schools to raise awareness about various types of victimization and their potential effects, empowering students to recognize and report such incidents. These policy and practice shifts aim not only to mitigate the current rates of victimization but also to prevent its escalation by addressing underlying risk factors comprehensively.

Limitations

First, this study focused on rural middle school students from two cities in southern China. Thus, the applicability of these findings to other age groups and regions remains uncertain. Consequently, cross-cultural comparative research is necessary to understand the heterogeneity of children's victimization experiences in diverse sociocultural contexts.

Second, one limitation in our study is the difficulty in accurately measuring the severity of poly-victimization, primarily due to the data relying on self-reports by children. Survey participants self-reported their victimization, including some sensitive information, which could affect the reliability of these reports. Furthermore, respondents were required to recall victimization events from the past year, introducing potential recall bias. Such biases may arise from children's varying perceptions, issues with memory recall, or reluctance to report traumatic experiences. These factors can collectively influence the accuracy of the data collected, potentially leading to an underestimation of the true incidence and severity of poly-victimization experienced by the participants.

Third, left-behind children in this study were classified based on whether they had been left-behind in the past year, which could exclude children who were left-behind long-term but not in the past year. In this study, left-behind children fall into two categories: those whose parents have worked abroad for a long time, and those whose parents stayed with them until recently leaving for work abroad. These two types of left-behind experiences may have different victimization rates, which were not distinguished in this study.

Despite these limitations, existing longitudinal and LCA studies often cover a broad age range, which may obscure the heterogeneity of poly-victimization among early adolescents. This study's advantage lies in its focus on junior high school students. Using LCA, it identified heterogeneous subgroups of poly-victimization among early adolescent children in rural China. It also explored conversion probabilities and influencing factors among different latent classes from a dynamic perspective. It offers a framework for understanding the development process of poly-victimization among children in China.

Conclusion

The intervention targets left-behind children and those with physical illnesses or disabilities who experience child maltreatment, as well as peer and sibling victimization. Children in this group have a higher incidence of poly-victimization, are more likely to continue experiencing it, and have a reduced likelihood of transitioning to the low-harm group. Finally, it is recommended to conduct follow-ups annually or even semiannually to analyze the progression of children's victimization and divide age into narrower ranges. This will help gain a preliminary understanding of victimization occurrence in children across different periods, revealing their experiences at various stages. It will highlight the heterogeneity of victimization, allowing for accurate classification and intervention.

Ethics Statement

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Shantou University Medical College. Informed consent was obtained from the study participants.

Funding

This work was supported by Science Planning General Project of Guangdong Philosophy Association [grant numbers GD19CSH08].

Disclosure

The authors have no conflicts of interest to disclose in this work.

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