

Peer Victimization in Extremely Low Birth Weight Survivors

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Abstract

Background. Extremely low birth weight (ELBW; <1000 g) children may be at risk for experiencing peer victimization. We examined retrospectively reported peer victimization in ELBW and control children in the oldest known, prospectively followed, population-based birth cohort of ELBW survivors. **Method.** We compared levels of verbal and physical peer victimization in ELBW and control children. We also predicted peer victimization in the ELBW sample from child characteristics. **Results.** ELBW children, especially girls, were at an increased risk for verbal, but not physical victimization. In addition, ELBW children with a higher IQ reported higher levels of verbal victimization, although ELBW females who had a lower body mass index in childhood reported higher levels of physical victimization. **Conclusion.** Findings highlight the need for parents and clinicians to be aware that ELBW girls, especially those with a lower body mass index in childhood, may be at increased risk of peer victimization, as are ELBW children with a higher IQ.

Keywords

peer victimization, bullying, extremely low birth weight, child, adolescent, predictor

Peer victimization (ie, bullying) is a common problem with up to 37.6% of children reporting that they are or have been victims of peer abuse.¹ Unfortunately, rates of victimization have remained stable or increased in Canada from 1994 to 2006.² Bullying is a type of aggression that is characterized by an intentional, systematic abuse of power that occurs on multiple occasions.³ Bullying can include physical victimization—such as hitting, beating, and kicking—and verbal victimization—such as calling someone derogatory names.⁴ The effects of being victimized by peers can be severe and include mental illness, social problems, lower quality of life, poorer health, lower academic achievement, and poorer vocational outcomes,^{5–8} many of which can persist into adulthood.⁹

Among the children at the highest risk for being bullied are those who exhibit poor motor skills, social and emotional maladjustment, and poor academic performance.^{10–12} One group thought to be at particular risk for peer victimization is children born at extremely low birth weight (ELBW; <1000 g), because they already manifest many of these risk factors. Despite this knowledge, only a few groups have described peer victimization in ELBW survivors. However, these studies are limited by (1) the use of relatively small samples, (2) a lack of examination of the possible cumulative effects of

bullying risk factors, and (3) contradictory findings as to whether ELBW children are at elevated risk compared with normal birth weight (NBW; >2500 g) children.^{13,14}

In the current study, we sought to replicate and extend previous research in this area by investigating both verbal (ie, name calling) and physical (ie, being hit, pushed, etc) peer victimization, and by examining the cumulative impact of factors that may put ELBW survivors at higher risk for being bullied. We compared levels of verbal and physical peer victimization in an ELBW sample and a matched NBW group to see if ELBW survivors experienced higher levels of bullying. In addition, we investigated the characteristics of ELBW victims in childhood and adolescence in order to understand what factors put ELBW survivors at greater risk.

For our first objective, we examined differences in levels of peer victimization between ELBW and NBW samples. In line with previous work, we expected that

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ELBW children experienced higher levels of verbal peer victimization but not physical peer victimization.¹⁵ For our second objective, we examined the factors that may put the ELBW sample more at risk for experiencing peer victimization. We anticipated that those most at risk within the ELBW sample would be boys,¹⁶ have a lower gestational age, poorer motor skills,^{10,17,18} and lower IQ.^{12,19,20} As in previous research, we did not expect cerebral palsy^{14,17} or childhood body mass index (BMI)^{14,17} to be associated with victimization in this group. Last, we examined possible moderation by sex in these associations because boys have been found to have poorer outcomes in childhood²¹ and are more likely to be victims of bullying²² than girls.

Method

Participants and Study Overview

Participants included ELBW survivors followed from birth and a group of NBW controls matched on sex, age, and socioeconomic status (SES) at age 8 years.²³ The ELBW survivors ($n = 397$) were recruited at birth in 1977-1982 in southwestern Ontario, Canada. Of these, 218 died prior to discharge from the hospital and 13 died after hospital discharge, resulting in 166 possible participants. For the purposes of this study, we focused on data collected at ages 8 years ($n = 156$, 94%) and 22 to 26 years ($n = 142$, 85%). Of the 142 ELBW participants at age 22 to 26 years, 131 (92%) provided data at both the age 8 and 22 to 26 visits.

The NBW sample ($n = 145$) was recruited at age 8 and participated at the same time points as the ELBW survivors. For the NBW sample, 133 (92%) participated at both the age 8 and 22 to 26 visits.

Within the ELBW and NBW samples, those who participated at the age 22 to 26 visit did not differ by child sex, gestational age, or SES from those who participated only at 8 years. For additional detail on these samples, please see the previous work of Saigal et al.^{23,24}

Measures

Peer Victimization. At 22 to 26 years, all participants provided a retrospective account of their experiences with verbal and physical peer victimization before the age of 16 on a 5-point scale (1 = never, 5 = more than 10 times). The 2 questions used to assess these constructs were adapted from the Childhood Experiences of Violence Questionnaire,²⁵ which measured verbal bullying ("Sometimes kids get hassled or picked on by other kids who say hurtful or mean things to them. How many times did this happen to you before age 16?") and physical bullying ("Sometimes kids get pushed around, hit or

beaten up by other kids or a group of kids. How many times did this happen to you before age 16?").

Predictors. Predictors of peer victimization within the ELBW group were collected at age 8 years. Familial SES was measured using the Hollingshead²⁶ 2-factor index of social position (1 = highest SES, 5 = lowest SES) that included education and occupational prestige. Child factors included sex (dummy coded: boys = 0, girls = 1), gestational age, presence of cerebral palsy (no = 0, yes = 1), and BMI at age 8 years. BMI was calculated as body mass in kilograms divided by the square of height in meters (kg/m^2). Children also completed the Bruininks-Oseretsky Test of Motor Proficiency²⁷ and 1 of 2 intelligence tests. The majority of children completed all 10 subtests of the Wechsler Intelligence Scale for Children-Revised.²⁸ The full-scale IQ measure was used in analyses. Children who were blind ($n = 10$) completed the Williams Intelligence Test for Children with Defective Vision.²⁹ Both measures are standardized ($M = 100$, $SD = 15$). Blind children were not able to complete the Bruininks-Oseretsky Test of Motor Proficiency and so did not have a measure of motor ability.

Data Analysis

For our first objective, we compared levels of verbal and physical bullying between the ELBW and NBW samples using t tests. For our second objective, in order to investigate the characteristics of the ELBW survivors who were victims of bullying, two separate hierarchical regression analyses were performed, one predicting verbal peer victimization and one predicting physical peer victimization. Predictor variables were centered as recommended.³⁰ On the first step, the other form of peer victimization was entered. This allowed us to examine the unique variability in each type of bullying after partialing out the variability that would be accounted for by the other measure of bullying. On the second step, familial SES was entered. On the third step, child factors (eg, child sex, gestational age, cerebral palsy, BMI, motor abilities, IQ) were entered. On the last step, interactions between predictors and sex were entered in a stepwise method to investigate potential moderation by child sex. Any significant interactions with sex were subsequently probed by reversing the dummy coded sex, creating a new interaction variable, and rerunning the regression analyses.³⁰

Results

The demographic, perinatal, and neurodevelopmental characteristics of the ELBW and NBW samples can be

Table 1. Maternal Demographic, Perinatal, and Neurodevelopmental Predictors.

	Extremely Low Birth Weight (n = 131)	Normal Birth Weight (n = 133)	Mean Difference [95% CI]
Maternal demographic data (child age = 8 years)			
Married, n (%)	118 (90.1)	119 (89.5)	0.01 [-0.07, 0.08]
Socioeconomic status (mean \pm SD)	3.21 \pm 0.91	3.08 \pm 1.03	0.14 [-0.10, 0.38]
Maternal education (mean \pm SD)	5.72 \pm 1.94	6.08 \pm 1.99	-0.37 [-0.84, 0.11]
Perinatal data			
Birth weight, g (mean \pm SD)	834.69 \pm 127.49	3387.66 \pm 480.50	-2552.97 [-2638.45, -2467.48]**
Gestational age, mo (mean \pm SD)	26.93 \pm 2.23	40.0 \pm 0.00	-13.07 [-13.45, -12.67]**
Female sex, n (%)	75 (57)	73 (55)	0.02 [-0.10, 0.14]
Developmental status (child age = 8 years)			
IQ (mean \pm SD)	93.16 \pm 14.59	104.17 \pm 12.37	-11.01 [-14.28, -7.73]**
Cerebral palsy, n (%)	12 (9.2)	1 (0.8)	0.84 [0.03, 0.14]**

** $p < .01$.

found in Table 1. The two samples did not differ by marital status, SES, highest level of education completed by the mother, or child sex. The ELBW sample had a lower birth weight, $t(262) = -58.81$, $p < .001$, gestational age, $t(262) = -67.70$, $p < .001$, and IQ, $t(262) = -6.61$, $p < .001$. The ELBW sample also had a higher number of children with cerebral palsy, $t(262) = 3.21$, $p = .002$.

Verbal Peer Victimization

For our first objective, we compared levels of verbal and physical peer victimization in ELBW and NBW samples (see Table 2). Overall, at 22-26 years of age, ELBW survivors retrospectively reported higher levels of verbal peer victimization prior to the age of 16 than NBW young adults at the trend level, $t(262) = 1.93$, $P = .055$ (effect size $d = 0.24$). ELBW women reported higher levels of verbal peer victimization in childhood than NBW women, $t(146) = 2.08$, $P = .04$ (effect size $d = 0.34$). ELBW men did not differ from NBW men on their verbal peer victimization experience before 16 years of age.

For our second objective, the overall regression predicting verbal peer victimization in ELBW survivors alone was significant (see Table 3). After controlling for physical peer victimization and SES, the child variables as a group significantly predicted a higher amount of the variance in verbal peer victimization in the ELBW group ($\Delta R^2 = .11$). Specifically, there was a positive association between child IQ and verbal peer victimization, $b = .02$, $p = .03$, such that as IQ increased among ELBW children, they reported more verbal peer victimization in childhood. There were also two associations that approached statistical significance. ELBW children born closer to term, $b = .10$, $p = .08$, and those with poorer motor abilities, $b = -.02$, $p = .07$, were more likely to report experiencing verbal peer victimization.

However, there were no significant sex differences among ELBW survivors.

Physical Peer Victimization

After controlling for verbal peer victimization and familial SES, the child variables did not significantly predict physical peer victimization (see Table 4). However, there was a significant interaction between BMI and child sex among ELBW survivors that explained a significantly higher amount of the variance in physical peer victimization ($\Delta R^2 = .05$). Following Aiken and West,³⁰ the associations with bullying were examined separately by child sex. When examining BMI, for ELBW girls, lower BMI was related to higher levels of recalled physical peer victimization, $b = -.13$, $p = .03$. For ELBW boys, higher BMI was related to higher levels of physical peer victimization at the trend level, $b = .13$, $p = .07$.

Discussion

In this study, we report that girls who were born ELBW experienced higher levels of verbal peer victimization than their NBW counterparts. However, levels of physical peer victimization did not differ between ELBW and control children. ELBW survivors experiencing higher levels of verbal bullying were children who had a higher IQ. Although child factors did not directly predict physical peer victimization, there was a significant sex interaction with BMI among ELBW survivors. BMI was an important predictor for girls born ELBW, as they were found to be more at risk for physical peer victimization if they had a lower BMI.

Previous studies examining peer victimization in ELBW and very low birth weight (VLBW; <1500 g)

Table 2. Comparisons of Peer Victimization Scores Between Extremely Low Birth Weight (ELBW) and Normal Birth Weight (NBW) Children.

	ELBW	NBW	Mean Difference [95% CI]
Verbal peer victimization			
Total population	n = 131	n = 133	
Mean ± SD	3.49 ± 1.43	3.14 ± 1.49	0.35 [-0.01, 0.70] ⁺
Median (range)	4.0 (1.0-5.0)	3.0 (1.0-5.0)	
Boys	n = 56	n = 60	
Mean ± SD	3.30 ± 1.46	3.15 ± 1.53	0.15 [-0.40, 0.71]
Median (range)	3.0 (1.0-5.0)	3.5 (1.0-5.0)	
Girls	n = 75	n = 73	
Mean ± SD	3.63 ± 1.39	3.14 ± 1.47	0.49 [0.03, 0.95]*
Median (range)	4.0 (1.0-5.0)	3.0 (1.0-5.0)	
Physical peer victimization			
Total population	n = 131	n = 133	
Mean ± SD	1.58 ± 0.91	1.50 ± 0.88	0.08 [-0.13, 0.30]
Median (range)	1.0 (1.0-5.0)	1.0 (1.0-5.0)	
Boys	n = 56	n = 60	
Mean ± SD	1.66 ± 0.79	1.62 ± 0.85	0.04 [-0.26, 0.35]
Median (range)	1.5 (1.0-4.0)	1.0 (1.0-4.0)	
Girls	n = 75	n = 73	
Mean ± SD	1.52 ± 0.99	1.40 ± 0.89	0.12 [-0.18, 0.43]
Median (range)	1.0 (1.0-5.0)	1.0 (1.0-5.0)	

⁺p < .10; *p < .05.

Table 3. Regression Analysis Predicting Verbal Peer Victimization in ELBW Children.

	b	R ²	ΔR ²
1. Physical victimization	.51**	.12	.12**
2. SES of head of household (1 = high)	-.11	.12	.01
3. Child sex (boys = 1)	-.18	.24	.11*
Gestational age	.10 ⁺		
Cerebral palsy	.27		
BMI	.07		
Motor score	-.02 ⁺		
IQ	.02*		
F for model	4.42**		

Abbreviations: BMI, body mass index; ELBW, extremely low birth weight; SES, socioeconomic status.

⁺The betas reported are the unstandardized betas from the last step in the hierarchical regression.

*p < .10; **p < .05; ***p ≤ .001.

children have found that they are at higher risk for peer victimization than control children.^{13,15,17,31} In addition, Yau et al¹⁴ found a statistically significant difference in their ELBW sample for boys, but there was no significant difference for girls or their overall sample. Although Nadeau et al¹⁵ found that VLBW children were more at risk for verbal peer victimization at age 7 years than NBW children, they found that VLBW youth were more at risk for physical peer victimization at age 12 years.³¹ Our finding that ELBW girls are more at risk for verbal

peer victimization than NBW girls may be a result of examining verbal and physical peer victimization separately, and throughout the child and adolescent time period, rather than examining peer victimization as a single construct during one time point. Girls are more at risk for verbal victimization than boys,¹ so children who bully may be more likely to verbally victimize ELBW girls than NBW girls because they look different³² and are physically smaller (and so may be perceived to represent easier targets).

Table 4. Regression Analysis Predicting Physical Peer Victimization in ELBW Children.^a

	b	R ²	ΔR ²
1. Verbal victimization	.20**	.12	.12**
2. SES of head of household (1 = high)	-.02	.12	.00
3. Child Sex (boys = 1)	.11	.16	.05
Gestational age	.04		
Cerebral palsy	-.57		
BMI ^b			
Boys	.13 ⁺		
Girls	-.13*		
Motor score	-.01		
IQ	-.01		
4. BMI × Child sex	-.26*	.22	.05*
F for model	3.49**		

Abbreviations: BMI, body mass index; ELBW, extremely low birth weight; SES, socioeconomic status.

^aThe betas reported are the unstandardized betas from the last step in the hierarchical regression.

^bThere was a significant sex interaction and the associations are reported separately for boys and girls.

⁺ $p < .10$; * $p < .05$; ** $p \leq .001$.

Although childhood BMI was not a significant predictor of verbal peer victimization, it is interesting that BMI was an important predictor of physical peer victimization in girls since previous research with ELBW and VLBW samples have not reported significant associations between victimization and BMI.^{14,17} This association is in the opposite direction to that reported in previous research conducted with general population samples where children who are overweight or obese are usually found to be at higher risk for experiencing bullying.^{11,33} As such, it was surprising that ELBW girls who had a lower BMI were more at risk for physical bullying. It may be that the girls in our study were smaller than in previous NBW research and/or the comorbidity of small size with other bullying risk factors present in ELBW survivors could explain why this effect was seen in our ELBW group and not in general population studies.

Within previous ELBW and VLBW research, girls with an IQ of less than 70 have been found to be more at risk for bullying.¹⁴ In NBW samples, children who have poorer academic ability and/or special needs also have been found to be at more risk for victimization.^{12,19,20} In our study, we found that IQ was not a significant predictor of physical peer victimization, but that children with a higher IQ were more at risk for verbal peer victimization. Given that the distribution of IQs in our ELBW sample (41 to 121) differs from general population samples used in studies of bullying, ELBW survivors with higher IQs may have been more socially involved with friends and peer groups than those with lower IQs who may have been less socially exposed and so had less opportunity to be victimized. In addition, ELBW children with lower IQs may have perceived less of the peer

victimization that they experienced or even recalled less when they were older.

There were limitations to this study, including our use of a retrospective measure of peer victimization. The participants were asked when they were aged 22 to 26 years about their experiences of peer victimization before the age of 16 years. It would have been better to ask participants while they were in school if they were experiencing peer victimization. This point notwithstanding, researchers have found that victims' recollections are stable over time³⁴ and that retrospective reports of victimization were correlated with actual victim/non-victim status 7 years later.³⁵ As a result, although concurrent reports of victimization would have been preferred, the retrospective accounts used in this study can still provide useful information. In addition, each type of peer victimization was also only measured by a single question. Although this approach is similar to other studies that used only a few questions to measure victimization in preterm children^{13,17}, it is still limited. Finally, the generalizability of our findings might also be affected by the fact that this sample was born in the late 1970s and early 1980s during the early era of neonatal intensive care units so there may be cohort differences versus ELBW children born more recently.

The strengths of this study include investigating peer victimization in the oldest known and longest prospectively followed population-based birth cohort of ELBW children. We also measured the collective impact of variables that are believed to be important in predicting peer victimization in an ELBW sample rather than measuring each predictor separately. This allowed us to reduce family-wise error and recognize the intercorrelations of the predictors. We also controlled for the other

type of bullying so that we know the associations of each predictor with the outcome measure of peer victimization was independent of any variance shared with the other type of peer victimization.

The results of this study support that ELBW children are at an increased risk for verbal peer victimization, but the difference is not large. These findings are important for parents of ELBW children and people working with these families because ELBW girls may be more at risk for verbal victimization. In addition, ELBW children with a higher IQ may be more at risk for verbal victimization, although girls with a lower BMI may be more at risk for physical victimization. Although the differences in peer victimization may not be large between ELBW and NBW children, more studies need to be performed to prospectively replicate these findings by using stronger, prospective measurement to investigate levels of peer victimization in ELBW and NBW samples and elucidate the predictors of peer victimization in ELBW samples born more recently. Future research also needs to investigate the long-term outcomes, such as social relationships, health, and wealth, for ELBW children experiencing peer victimization in order to uncover if peer victimization has a stronger, longer lasting impact on ELBW children who were already born at increased risk for negative outcomes.⁹

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Author Contributions

KLD contributed to the conception and design of the study, the analysis and interpretation of the data, and drafted and critically revised the manuscript. RJV and LAS contributed to the conception and design of the study, the analysis and interpretation of the data, and critically revised the manuscript. TV contributed to the design of the study, interpretation of the data, and critically revised the manuscript. SS and MHB contributed to the acquisition and interpretation of the data and critically revised the manuscript. All authors gave final approval of the manuscript.

Declaration of Conflicting Interests

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