

ORIGINAL ARTICLE

Exposure to overprotective parenting and psychopathology in extremely low birth weight survivors

K. L. Day^{1†}  | K. G. Dobson^{2‡} | L. A. Schmidt³ | M. A. Ferro⁴ | S. Saigal⁵ | M. H. Boyle^{1,2} | R. J. Van Lieshout^{1,2}

¹Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Canada

²Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Canada

³Department of Psychology, Neuroscience, and Behaviour, McMaster University, Hamilton, Canada

⁴School of Public Health and Health Systems, University of Waterloo, Waterloo, Canada

⁵Department of Pediatrics, McMaster University, Hamilton, Canada

Correspondence

Kimberly L. Day, Department of Psychology, University of West Florida, 11000 University Parkway, Pensacola, FL 32514, USA.
Email: kday@uwf.edu

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Abstract

Background: Extremely low birth weight (ELBW; <1,000 g) infants are the most vulnerable babies and are at higher risk for experiencing overprotective (i.e., controlling and intrusive) parenting, which is hypothesized to contribute to the risk for mental disorders. Despite the increased risk for anxiety disorders and decreased risk for alcohol or substance use disorders seen in ELBW survivors, no research has examined the impact of parenting. This study investigated if overprotective parenting mediates links between ELBW birth status and psychiatric disorders in adulthood.

Study design: Participants included ELBW survivors born in 1977–1982 and matched normal birth weight ($\geq 2,500$ g) control participants (ELBW $n = 81$; normal birth weight $n = 87$) prospectively followed in Ontario, Canada. These individuals retrospectively reported on whether either of their parents was overprotective using the Parental Bonding Instrument. Presence of a current anxiety disorder and of current alcohol or substance use disorders was assessed using the Mini International Neuropsychiatric Interview at age 29–36 years.

Results: Path analysis showed that overprotective parenting was a significant mediator of the association between ELBW status and risk for an anxiety disorder in adulthood and the risk for an alcohol or substance use disorder in adulthood in ELBW survivors. Overprotective parenting accounted for 53% of the association between ELBW status and the risk for an anxiety disorder in adulthood and 26% of the association between ELBW status and alcohol or substance use disorders.

Conclusions: Overprotective parenting accounted for a substantial proportion of the increased risk for anxiety and alcohol or substance use disorders in adulthood in ELBW survivors. Despite their perceived vulnerabilities, it is important that the parents of ELBW survivors be supported in their attempts to facilitate their children's pursuit of independence during childhood and beyond.

KEYWORDS

adult, infant, extremely low birth weight, longitudinal, mental disorders, parenting

1 | INTRODUCTION

Infants born at extremely low birth weight (ELBW; <1,000 g) are the tiniest, most at-risk babies, and have been found to be at greater risk

for a number of psychiatric problems across the lifespan (Boyle et al., 2011; Hack et al., 2004; Lindström, Lindblad, & Hjern, 2009; Mathewson et al., 2017; Van Lieshout, Boyle, Saigal, Morrison, & Schmidt, 2015). Recent research suggests that they may be at particularly high risk for anxiety disorders and especially low risk for alcohol or substance use disorders in adulthood compared to those born at term (Cooke, 2004; Hack et al., 2002; Van Lieshout et al., 2015). However, a limitation of extant studies is that they have been largely

[†]Dr. Kimberly L. Day is now in the Department of Psychology at the University of West Florida. [‡]Ms. Kathleen G. Dobson is now in the Dalla Lana School of Public Health, Epidemiology Division at the University of Toronto.

descriptive and failed to explore the risk and protective factors that may underlie these associations, including the influence of parenting. Because ELBW survivors can suffer from a range of cognitive and health problems very early in life, it has been hypothesized that these children may elicit more involved and protective responses from parents (Feldman, 2007; Jaekel, Wolke, & Chernova, 2012; Pyhälä et al., 2011; Wightman et al., 2007). Indeed, being born ELBW may affect how parents interact with these vulnerable children, which could, in turn, affect ELBW survivors' health later in life (Sameroff, 1975).

In general population samples consisting predominantly of individuals born at normal birth weight (NBW; $\geq 2,500$ g), overprotective parenting (e.g., parenting high in controlling and intrusive behaviour) has been found to be associated with an increased risk of anxiety problems (Edwards, Rapee, & Kennedy, 2010; Hudson & Rapee, 2001; Spokas & Heimberg, 2009; Wood, McLeod, Sigman, Hwang, & Chu, 2003). Overprotective parenting is also more commonly reported by adolescents who drink regularly and adults with alcohol or other substance use disorders (Emmelkamp & Heeres, 1988; Visser, de Winter, Vollebergh, Verhulst, & Reijneveld, 2012). Despite these findings, this approach to parenting has not been investigated for its role in the development of psychiatric disorders in the ELBW population.

Researchers have suggested that overprotective parenting may contribute to the development of anxiety disorders in individuals by limiting their sense of independence and competency (Visser et al., 2012; Wood et al., 2003). Parents who utilize this parenting style may induce anxiety by teaching their children that the world is unsafe and encourage dependency on parents. As anxiety disorders are believed to be the most common psychiatric disorder in adult ELBW survivors (Mathewson et al., 2017; Van Lieshout et al., 2015), understanding the modifiable processes that may contribute to this risk could aid in the development of early detection and preventive measures.

In contrast to their increased risk for anxiety disorders, ELBW survivors appear to be protected against alcohol or substance use disorders (Cooke, 2004; Hack et al., 2002; Van Lieshout et al., 2015). As with their typically developing peers, overprotective parenting may be so detrimental to development that it may increase the risk of alcohol or substance use disorders. Therefore, although parents may be more overprotective because of their ELBW children's increased adversity, this parenting style may actually increase their risk for both anxiety and alcohol or substance use disorders in adulthood.

As a result of these uniquely high levels of anxiety and low rates of alcohol or substance use disorders in adulthood between those in ELBW adults and at term, it is of interest to explore the different mechanisms that may explain this pattern of findings. The purpose of this study was to investigate whether overprotective parenting mediated associations between ELBW birth status and the presence of an anxiety and alcohol or substance use disorders into the fourth decade of life. It was expected that for ELBW participants, overprotective parenting would be associated with an increased risk for an anxiety disorder and alcohol or substance use disorders in adulthood.

Key messages

- In this prospective, population-based longitudinal study of matched extremely low birth weight (ELBW) and normal birth weight ($\geq 2,500$ g) participants, being born ELBW was associated with greater risk for having an overprotective parent which, in turn, was associated with greater risk for an anxiety and alcohol or substance use disorder at age 29–36 years.
- Despite their perceived vulnerability, it may be beneficial for the parents of ELBW survivors to facilitate their children's pursuit of independence during childhood and beyond.

2 | METHOD

2.1 | Sample

At its inception, the cohort consisted of 397 children born ELBW from Southwestern Ontario and recruited at birth between 1977 and 1982. Of these, 179 ELBW children survived to hospital discharge (Saigal, Rosenbaum, Stoskopf, & Sinclair, 1984). Additional assessments were completed at 3, 5, 8, 12–16, and 22–26, and 29–36 years of age. One hundred forty-five NBW controls were recruited at age 8 and were matched for age, sex, and parental socio-economic status (SES) (Saigal, Szatmari, Rosenbaum, Campbell, & King, 1991). Data at the age 22- to 26-year visit (ELBW = 149; NBW = 133) and the age 29- to 36-year visit (those who completed the outcome measure: ELBW = 84 and NBW = 90) were used in this study, as were those collected at birth and age 8. Only participants who reported on both parents were included in analyses, which included 81/179 (45%) ELBW participants and 87/145 (60%) NBW participants. Approval for the use of human participants for this study was obtained through the McMaster University's and Hamilton Health Sciences' ethics committees.

2.2 | Mediator: Overprotective parenting

Parenting was retrospectively reported at age 22–26 by participants using the 25-item self-report Parental Bonding Instrument questionnaire (PBI; Parker, 1988), which utilizes a 4-point Likert-type scale for each item (1 = *Very like*, 4 = *Very unlike*). The PBI has shown strong reliability and validity over recall periods up to 20 years (Wilhelm & Parker, 1990). The 13 items from the PBI were combined (for this sample: $\alpha = .84$ mother and $\alpha = .87$ father), to create its overprotective parenting subscale (sample item includes: "Tried to control everything I did,"). Scores of >13 on the maternal or >12 on the paternal scale are suggestive of overprotective parenting (Parker, 1988). Participants were included in analyses if they reported on both a mother and father figure because it was expected that children with only one parental figure would differ from those who had two parental figures on factors including level of financial support, emotional support, and time spent in the care of parents.

The majority of participants reported on a birth/biological mother (ELBW 91%, NBW 97%) and a birth/biological father (ELBW 89%, NBW 86%). Overprotective parenting was dummy coded (0 = *neither parent overprotective*, 1 = *at least 1 overprotective parent*).

2.3 | Outcome: Anxiety and alcohol or substance use disorders

Current anxiety and alcohol or substance use disorders were assessed at age 29–36 years using the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1997). The MINI is a validated, structured diagnostic psychiatric interview that was conducted by trained interviewers naïve to birth weight status. Van Lieshout et al. (2015) previously reported the procedures for this sample. A minimum prevalence threshold of 5 cases total was required for a disorder to be included. Current anxiety disorder outcome included current panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, and generalized anxiety disorder. Current alcohol abuse, alcohol dependence, drug abuse, and drug dependence were combined into a single variable comprising current alcohol or substance use disorders.

2.4 | Birth and childhood variables

Participants' sex, birth weight, and gestational age were measured at birth and collected from their medical charts for those born ELBW. For the NBW group, these characteristics were reported at age 8 by participants' mothers. Familial SES at age 8 was measured using the Hollingshead's (1969) two-factor index of social position, which includes education and occupational prestige (1 = *highest SES level*, 5 = *lowest SES level*).

Covariates included participants' sex and familial SES measured at age 8 as they have been found to confound associations between parenting styles and child outcomes (Raby, Roisman, Fraley, & Simpson, 2015).

2.5 | Participant attrition

Differences between participants and non-participants at age 29–36 years were investigated within each group as these participants have been followed into adulthood, and attrition could affect the validity of the analyses. We examined participants' sex, gestational age, birth weight, and familial SES as predictors of non-response. We also examined the ability of overprotective parenting to predict non-response from the age 22- to 26- to the 29- to 36-year visit.

Within the ELBW sample, those who participated at both the birth and age 29–36 visits were more likely to be female ($\chi^2 = 4.45, p = .04$),

and those who participated at both the age 8 and age 29–36 visits were more likely to have a higher SES (mean difference = 0.35, 95% confidence interval, CI [0.06, 0.64]) than those who did not participate at both visits. There were no other statistically significant differences for those who did and did not participate at both visits.

For the NBW sample, those who participated at both the age 8 and age 29–36 visits were more likely to have a higher SES (mean difference = 0.36, 95% CI [0.02, 0.70]) than those who did not participate at both visits. There were no other statistically significant differences in the NBW sample.

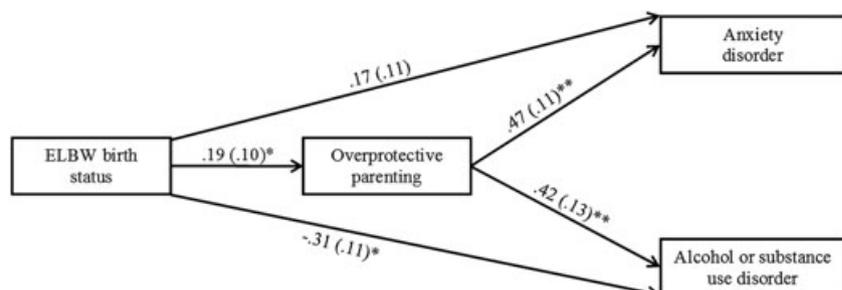
2.6 | Missing data

Out of those who completed the MINI at age 29–36 years (ELBW = 84, NBW = 90), 3 ELBW and 3 NBW participants did not report on a father figure. Therefore, the total sample size was 81 participants born ELBW and 87 participants born NBW. Among participants included in the analyses, 98% ($n = 165$) had no missing information and 2% ($n = 3$) had missing SES at age 8. Using IBM SPSS 22 (IBM SPSS Statistics, IBM Corporation), data on SES were imputed to increase our statistical power and to ensure that the sample was representative of all participants (Chevret, Seaman, & Resche-Rigon, 2015). For the multiple imputation analysis, missing data for SES was imputed using the fully conditional specification using IBM SPSS 22 (IBM SPSS Statistics, IBM Corporation). Ten imputation data sets were created, and the average SES from the 10 imputed datasets was used in all analyses.

2.7 | Data analysis

Univariate descriptive statistics were completed to describe the study sample, and bivariate analyses were used to compare the demographics between the ELBW and NBW samples. Within a structural equation modelling framework, path analysis was conducted using Mplus 7.31 (Muthén & Muthén) to test the hypothesis that overprotective parenting mediates the association between ELBW birth status and the presence of psychiatric disorders in adulthood. All paths were modelled simultaneously (Figure 1) and controlled for the potential confounding effects of participants' sex and familial SES. The weighted least squares means and variances adjusted estimator was specified so that logistic regressions were computed within the path analysis. This estimator does not assume that variables are normally distributed and has been recommended for modelling categorical or ordered data (Brown, 2006). Common guidelines for model fit indices were used to determine the fit of the data to the specified model, including the χ^2 goodness-of-fit $p > .05$ (Barrett, 2007), comparative fit index (CFI) $> .90$

FIGURE 1 Path analysis examining the associations between extremely low birth weight (ELBW) birth status, overprotective parenting, and psychiatric disorders. Notes. Covariates included participants' sex and familial socio-economic status. Standardized betas (standard errors). ** $p \leq .001$, * $p < .05$



(Bentler, 1990), and root mean square error of approximation (RMSEA) and associated 90% CI $\leq .08$ (Browne & Cudeck, 1992; MacCallum, Browne, & Sugawara, 1996).

The product of coefficients method was used to calculate the magnitude of the mediated effects (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), whereas bias-corrected bootstrapping ($n = 5,000$) was used to estimate the associated CIs (MacKinnon, Lockwood, & Williams, 2004). The proportion of the mediated effect to the direct effect (MacKinnon, 2008) was calculated to provide a measure of effect size.

3 | RESULTS

Demographic characteristics of the ELBW and NBW samples can be found in Table 1. As expected, the ELBW sample had a lower birth weight (mean difference = $-2,577$ g, 95% CI $[-2,685, -2,468]$) and gestational age (mean difference = -13.0 weeks, 95% CI $[-13.5, -12.5]$). We also ruled out the possibility that the ELBW survivors may be more likely to report having an overprotective parent because of living with their parents. Of participants who retrospectively reported on their parents' behaviour at age 22–26 years, equal proportions of the ELBW and NBW samples were living independently (38.3% ELBW, 48.3% NBW; $\chi^2 = 1.71, p = .19$).

3.1 | Direct effects between study variables

The path model and parameter estimates are shown in Figure 1. The model fit was acceptable, RMSEA = 0.083, 90% CI $[0.000, 0.172]$, CFI = .921, $\chi^2(3) = 6.51, p = .089$, based on having a non-significant χ^2 goodness-of-fit and the practical fit index of CFI meeting the threshold of $>.90$. Although the RMSEA CI was above the recommended cut-off of about .08 or less by Browne and Cudeck (1992) and MacCallum et al. (1996), the RMSEA has been found to often exceed cut-offs with models with low degrees of freedom (Kenny, Kaniskan, & McCoach, 2015). In this path model, being born ELBW was associated with a higher likelihood of reporting at least one overprotective parent ($\beta = .19, SE = .10, p = .048$). Reporting at least one overprotective parent was significantly associated with having an anxiety disorder

TABLE 1 Demographic characteristics of participants at age 29–36 years

Characteristic	ELBW	NBW
Participated at age 29–36, <i>n</i>	81	87
Gender, male, <i>n</i> (%)	31 (38)	35 (40)
Birth weight, <i>M</i> (<i>SD</i>) grams**	827 (133)	3403 (477)
Gestational age, <i>M</i> (<i>SD</i>) weeks**	27 (2)	40 (0)
Familial SES, <i>M</i>	3	3
Overprotective parent, <i>n</i> (%)	34 (40)	26 (26)
Anxiety disorder, <i>n</i> (%)*	24 (30)	12 (13)
Alcohol or substance use disorder, <i>n</i> (%)*	10 (12)	23 (26)

Notes. Familial SES (1 = highest SES level, 5 = lower SES level).

ELBW = extremely low birth weight; NBW = normal birth weight; SES, socio-economic status.

** $p < .001$.

($\beta = .47, SE = .11, p < .001$) and an alcohol or substance use disorder ($\beta = .42, SE = .13, p = .001$) at age 29–36 years.

3.2 | Mediated effects

The effect of ELBW birth status on risk for an anxiety disorder in adulthood was mediated by overprotective parenting ($\beta = .19, 95\% \text{ CI } [0.01, 0.47]$). In other words, being born at ELBW increased risk for overprotective parenting, which subsequently increased risk for an anxiety disorder in adulthood. Fifty-three percent of the direct effect from ELBW birth status to an anxiety disorder was mediated by overprotective parenting.

In addition, the effect of ELBW birth status on risk for an alcohol or substance use disorder was mediated by overprotective parenting ($\beta = .18, 95\% \text{ CI } [0.01, 0.48]$). Again, being born at ELBW increased risk for overprotective parenting, which subsequently increased risk for an alcohol or substance use disorder in adulthood. Twenty-six percent of the direct effect from ELBW birth status to an alcohol or substance use disorder was mediated by overprotective parenting.

4 | DISCUSSION

The purpose of this study was to determine whether reported overprotective parenting mediated associations between ELBW birth status and anxiety and/or alcohol and substance use disorders in the fourth decade of life. Overprotective parenting was found to partially mediate associations between ELBW birth status and current presence of an anxiety disorder and of an alcohol or substance use disorder at age 29–36 years. Our findings suggest that being born at ELBW is associated with an increased risk for reported overprotective parenting which, in turn, was associated with increased risk for certain psychiatric disorders in adulthood. These findings support Sameroff's transactional perspective of development (Sameroff, 1975) as child characteristics were associated with parenting, and parenting, in turn, was associated with later outcomes. However, partial mediation indicates that although overprotective parenting explains a portion of the association between ELBW birth status and these disorders in adulthood, other factors are involved.

Our finding that reported overprotective parenting was associated with an increased risk for an anxiety disorder in adulthood mirrored findings in NBW samples (Edwards et al., 2010; Hudson & Rapee, 2001; Spokas & Heimberg, 2009; Wood et al., 2003). As discussed by Wood et al. (2003), overprotective parenting may be associated with increased risk for anxiety disorders because parents who are overprotective fail to encourage their children to engage in age-appropriate self-help behaviours. These children also may not experience appropriate boundaries in the home environment. As a result, children born ELBW, who are already more likely to have a cautious and risk-averse personality (Waxman, Van Lieshout, Saigal, Boyle, & Schmidt, 2013), may not develop the self-confidence necessary and may end up more dependent on their parents (Wood et al., 2003). This dependence may occur throughout their life and manifest as anxiety (e.g., generalized anxiety disorder and social anxiety disorder) in adulthood. Another possible explanation is that overprotective

parenting in situations that elicit anxious responses in ELBW children and adolescents may reinforce child anxiety and prevent children from habituating to novel contexts, further reinforcing their cautious and risk-averse personality. This avoidance of difficult situations may perpetuate anxiety over time.

Our findings with ELBW survivors and alcohol or substance use disorders are also consistent with previous findings with NBW samples (Emmelkamp & Heeres, 1988; Visser et al., 2012) in that reported overprotective parenting is associated with an increased risk for these disorders. Overprotective parenting may disturb the development of children's autonomy and encourage children to be dependent on their parents (Visser et al., 2012), which may result in a more dependent personality style.

Because of the unique conditions under which ELBW survivors are born, parents may have to be more focused on the more acutely pressing medical needs of their children and so emphasize the psychosocial needs of their children relatively less (Ungar, 2009). In addition, these parents may think that it is necessary to act in a more overprotective way in order to help their children recover from their past adverse exposures in their attempts to help their children reach their full potential (Ungar, 2009). Parents of ELBW survivors may understandably feel the need to protect their children who are born under challenging conditions and who experience great adversity; however, it may be of value to support these parents (who may themselves be struggling with adjusting to life with a premature infant) so that they can facilitate their children's pursuit of independence. Future research is needed to understand the best way to support preterm children's parents (Jaekel, 2016).

4.1 | Limitations

The longitudinal nature of this study did result in some limitations, most notably a relatively small sample size at our age 29- to 36-year time point. Moreover, our measure of parenting was retrospectively reported by the ELBW and NBW participants and not the parents themselves. Furthermore, the same respondent reported on overprotective parenting and psychiatric disorders; however, the possible informant bias was offset by separating the assessments by nearly 10 years. In addition, we only included participants who reported on a mother figure and father figure, so these results may not be generalizable to all families, including single-parent families or families with two parental figures of the same sex. Despite these limitations, this is still the first study known to investigate the influence of parenting in mediating associations between ELBW birth status and psychiatric disorders up to the fourth decade of life.

4.2 | Conclusions

In studying the oldest ELBW cohort in the world, overprotective parenting was a significant mediator of associations between preterm birth status and the presence of an anxiety disorder and of an alcohol or substance use disorder in adulthood. However, overprotective parenting only partially mediated these associations, which highlights the need to examine other potential mechanisms that explain risk and resilience in this population. Future work should aim to

replicate these findings and determine if interventions aimed at supporting the parents of preterm survivors have the potential to prevent or reduce the severity of mental disorders in this vulnerable population.

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