



The impact of maternal lifetime stressor exposure on child effortful control in the preschool years: Findings from the Behavior Outlook Norwegian Developmental study

Jasmine Lee^a, Harald Janson^b, Ane Nærde^b, Eirini Flouri^{a,*}

^a Department of Psychology and Human Development Institute of Education University College London London United Kingdom

^b The Norwegian Centre for Child Behavioural Development Oslo Norway

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ABSTRACT

We carried out this study to explore the role of maternal lifetime stressor exposure on child effortful control at age 4 years, using data from the Behavior Outlook Norwegian Developmental Study ($n = 1,101$). At child's age 4 years the mother reported whether she had ever experienced any of the following: death of someone close, violence, abuse, bullying, serious financial problems, hunger or homelessness, and being a refugee. We did not find an impact of maternal lifetime exposure to stressors on child effortful control. Findings were null irrespective of operationalisation of adversity (i.e., whether a linear or threshold model of cumulative risk was tested or whether specific adversities were considered). Socioeconomic risk and gender were far stronger predictors and remained significant across models. Future research should explore how proximal experience of socioeconomic disadvantage impacts effortful control early in development.

1. Introduction

Developing effortful control (EC), i.e., the ability to effortfully control attention, emotions and behaviour, is one of the key developmental milestones in early childhood, with significant implications for later cognitive, social and emotional development (Kochanska et al., 2000). EC refers to the inhibition of dominant and activation of subdominant responses (Rothbart & Bates, 2007). It includes the capacity not only to inhibit responses, but also to focus and shift attention, as well as plan and detect errors (Rothbart et al., 2001; Zhou et al., 2012). Viewed as the temperamental basis of self-regulation (SR), it is often described as a subclass of SR that is specifically linked to attentional networks (Rothbart & Ahadi, 1994)(Kochanska & Knaack, 2003) (Hill-Soderlund & Braungart-Rieker, 2008; Rothbart & Bates, 1998). It also differs significantly by sex. For example, girls have consistently been shown to have higher levels of EC than boys across development (Backer-Grøndahl & Nærde, 2017; Kochanska et al., 2000; Olson et al., 2005).

EC is related to a wide range of outcomes throughout the lifespan, from physical and mental health to academic performance and economic success (Eisenberg et al., 2007; Hernández et al., 2017; Padin et al., 2017). It is thought to play a key role in emotion regulation, as it involves modulating the expression and inhibition of emotions

depending on the context (Bush et al., 2000; Eisenberg et al., 2000), in turn linked with mental health. For example, there is now strong evidence that low EC is associated with externalising problems related to impulsivity, as well as internalising problems such as depression and anxiety (Gulley et al., 2016; Jonas & Kochanska, 2018; Olson et al., 2005). In terms of links with academic outcomes, several longitudinal studies have found a positive association between early EC and later academic self-efficacy and performance (Blair & Razza, 2007; Liew et al., 2008; Valiente et al., 2011). This may be because the attentional control aspect of EC is key to concentration in tasks and motivation regulation, both of which contribute to academic success (Ponitz et al., 2009).

1.1. The role of the family environment in child EC

Although child EC is considered relatively stable, it can also be influenced by environmental factors such as parenting. However, the extent of the impact of the environment is still debatable. An early study, for example, found a heritability of 43–58 % in EC in a small sample of 3-year-old twin pairs and attributed the rest to environmental influences (Goldsmith et al., 1997). A more recent birth record study, however, found a stronger genetic component to EC (parent-reported with the

* Corresponding author at: Department of Psychology and Human Development, Institute of Education, University College London, London, United Kingdom.
E-mail address: e.flouri@ucl.ac.uk (E. Flouri).

Children's Behaviour Questionnaire, a version of which was used in the present study) for children at age 8, with a heritability of around 68–79 % (Lemery-Chalfant et al., 2008). Regardless, these findings are consistent with the notion of EC as responsive to environmental inputs, especially in the family.

A particularly important environmental influence of child EC is family socioeconomic disadvantage (Adjei et al., 2022; Lereya & Wolke, 2013; Schoon & Melis, 2019; Wadman et al., 2020), with children from lower socioeconomic status (SES) families demonstrating poorer EC than their counterparts (Atherton et al., 2020). This may be due to their greater exposure to chronic stressors, such as family turmoil, parental mental illness and neighbourhood disorder (Evans & Kim, 2013). Poor living conditions and exposure to destabilising stressors, both of which are related to low SES, have also been shown to negatively impact child EC and in a dose–response manner (McCoy & Raver, 2014). More broadly, reduced accessibility to educational resources, caregiver support and health services, that also accompanies poverty and low SES, affects children's cognitive development and emotion regulation (McLoyd, 1998; Raver et al., 2012), linked to EC as discussed. In Norway, Backer-Grøndahl & Nærde (2017) found that low SES (measured as low parental education and poor living environments) predicted lower EC in 2-year-old children from the Behavior Outlook Norwegian Developmental Study, the longitudinal dataset used in the present study. Another Norwegian study also found that parental education and income predicted teacher-reported SR (Størksen et al., 2015), strongly linked to EC as discussed, in 5-year-olds.

Parental stressor exposure, independently of SES, has also received much attention as an environmental influence of child EC. Many studies, for instance, have established a long-term link between a mother's exposure to adversity in childhood and her own child's negative emotionality and behavioural dysregulation, via her depression and low parental sensitivity (Bouvette-Turcot et al., 2020) (Berlin et al., 2011; Goodman et al., 2011). In turn, parental sensitivity and healthy and warm parent–child interactions are key contributors to EC in young children, both directly (Kochanska et al. (2000) and via positive and proactive parenting that incorporates scaffolding and therefore creates opportunities for the child to initiate and complete tasks and thus improve in EC (Neale & Whitebread, 2019). For example, refugee parents exposed to war or parents abused as children often struggle momentarily with mental health problems, giving rise to more harshness and less warmth in parenting, and in turn poorer psychosocial functioning in children (Eltanamy et al., 2021; Peltonen et al., 2022).

1.2. The current study

The current study investigates the role of parental stressor exposure in EC in Norwegian preschool children. It uses data from a large longitudinal study to explore the role of maternal lifetime adversity, independently of demographic, social and economic family characteristics, in parent-reported EC in 4-year-old children. It is hypothesised that, even after controlling for these characteristics, children whose mothers faced substantial adversity (such as violence, abuse and serious financial problems) across their lifetime would have poorer EC.

Norway is in many ways unique as its Early Childhood Education and Care (ECEC) is considered a very high national priority, and is much more affordable and accessible compared to many countries, such as the US (Lenes et al., 2020). Its well-developed welfare system includes free universal healthcare and heavily subsidised ECEC. For example, 97 % of Norwegian children aged 3 to 5 are in ECEC settings, and almost all (98 %) attend free public schools (Statistics Norway, 2021). Norway also has relatively low rates of unemployment and inequality compared to other wealthy countries (Vacas-Soriano & Fernández-Macías, 2017), and achievement gaps are smaller (Chmielewski & Reardon, 2016). However, poverty and income inequality have been on the rise (Molland et al., 2021). A particularly important issue in Norway is the association between immigrant status and low SES, potentially due to the extra

burden of language barriers in accessing education and employment (Ribeiro et al., 2022). The current study therefore asks: In a wealthy welfare state, where the strong ECEC system is supposedly conducive to healthy early development, does parental lifetime exposure to serious adversity, independently of socioeconomic risk, affect child EC in the preschool years? Our hypothesis was that maternal lifetime stressor exposure would still be inversely related to child EC.

2. Methods

2.1. Participants

The study uses data from the Behavior Outlook Norwegian Developmental Study (BONDS), a longitudinal study comprising 1,159 children (559 girls) from five municipalities in southeast Norway. Conducted by the Norwegian Centre for Child Behavioural Development (NCCBD), BONDS adopts a multi-method, multi-informant approach to measure children's social, cognitive and behavioural development from 6 months onwards (for more details see Nærde et al., 2014). BONDS benefits from high participation and retention rates – 60 % of those informed of the study agreed to participate, and participation rates for follow-ups were 98 % at 12 months, 92 % at age 3, and 93 % at age 4. The sample largely resembles the general population, albeit with a larger proportion of mothers with higher education levels and a smaller proportion of foreign-born mothers. The bias towards higher education is common in research involving voluntary participation, whereas the bias towards native births may be due to BONDS requiring participants to be fluent in Norwegian. BONDS is unique in its focus on infancy and early childhood in a Scandinavian context and inclusion of detailed psychological measures. In the current study, we examine the effects of maternal lifetime stressor ('adversity') exposure on child EC at age 4, controlling for gender and the following confounders (associated with both exposure and outcome): socioeconomic risk, presence of close-aged sibling and mother's age. All data in this study were provided by NCCBD.

2.2. Ethical considerations

The current study involved only secondary data from the original BONDS, in which all participants provided informed written consent to take part. BONDS received ethical approval from the Regional Committee for Medical and Health Research Ethics and the Norwegian Data Inspectorate. NCCBD approved and provided data for this project. Due to its sensitive nature, we used the University of Oslo's TSD platform to access and analyse data securely, and no analysis could be conducted outside of this platform. The data were fully anonymised with no identifying information.

2.3. Measures

2.3.1. Effortful control (EC)

Effortful control (EC) at age 4 was measured using the Very Short Form of the Children's Behaviour Questionnaire (VSF-CBQ), modified from the original CBQ (see Putnam & Rothbart, 2006; Rothbart et al., 2001). A 5-point instead of the original 7-point Likert Scale was used in BONDS as piloting suggested difficulties with the response format. The current study uses data from the EC dimension, which includes 12 items ($\alpha = 0.66$) measuring Inhibitory Control, Attention Focusing, Low Intensity Pleasure, and Perceptual Sensitivity (Table 1). The EC score in BONDS (range 1–5) is the mean of all 12 items applicable to the child in the last 6 months, as determined by the parent. Reports were used from whichever parent (mother or father) was present at the age 4 assessment. In our sample, child EC was father-reported by only 8.6 % of the cases.

Table 1
The 12 effortful control (EC) items, by subscale, of the VSF-CBQ in BONDS.

EC subscale	Mean score (range 1–5)	EC item
Inhibitory Control	3.75	Is good at following instructions. Prepares for trips and outings by planning things s/he will need. Approaches places s/he has been told are dangerous slowly and curiously.
Attention Focusing	3.89	When drawing or colouring in a book, shows strong concentration. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods. Sometimes becomes absorbed in a picture book and looks at it for a long time.
Low Intensity Pleasure	4.11	Likes being sung to Likes the sound of words, as in nursery rhymes. Enjoys gentle rhythmic activities, such as rocking or swaying.
Perceptual Sensitivity	4.06	Notifies it when parents are wearing new clothing Is quickly aware of some new item in the living room Comments when a parent has changed his/her appearance.

2.3.2. Adversity (maternal lifetime stressor exposure)

In BONDS, when the study child was aged 4 years, mothers reported on their lifetime exposure to each of seven stressful life events: death of someone close; refugee because of being threatened; victim of violence or other criminal actions; mental, physical, or sexual abuse; bullying; serious financial problems; no food or home for a period. In particular, they were asked: “This question applies to major life events you may have experienced at some point in your life”.

2.3.3. Confounders

These were as follows. *Family socioeconomic risk*: Information about family socioeconomic risk was obtained from both parents when the child was 6 and 12 months of age. A cumulative score was created by summing the endorsement (yes/no) of five risks: at least one parent has

low education; at least one parent is unemployed or at home; at least one parent reported enduring financial hardship in the past year; poor housing conditions; and single-parent family (Appendix A). Possible scores ranged from 0 to 5, with higher scores indicating greater risk. *Gender*: Child’s gender was registered at study inclusion (at 6 months), with 1 – Boy and 2 – Girl. *Presence of close-aged sibling*: Parents reported whether there were any similar-aged siblings in the family when the child was 6 months of age, i.e., another child no older than 5.5 years old. *Maternal age*: Mothers reported their age at the initial interview when the child was 6 months old.

2.4. Analytic strategy

Analyses were conducted with R4.2.2 on RStudio. Pre-processing involved multiple imputation of data and operationalisation of adversity (see below). Multiple linear regressions and logistic regressions (after a median split on the skewed [see Tables 1 and 2] EC variable) were conducted to examine the effects of maternal lifetime exposure to adversity on child EC. All models were fitted before and after adjustment for covariates. We present the results from the multiple linear regression models here and include the results from the logistic regression models in the Supplement (Appendices C and D).

2.4.1. Missing data

Rows with null data for all EC reports (at ages 2, 3 and 4 in BONDS) were removed, resulting in a sample size of 1,101. The average percentage of missing data on exposure and outcome (i.e., adversity and EC, respectively) as well as covariates (gender, socioeconomic risk, presence of close-aged sibling, maternal age) was 5.22 %, with none exceeding 8 %. See Appendix B for the proportion of missingness in each variable. Missing data on the sample was then multiply imputed using the Multivariate Imputation by Chained Equations (MICE) package on R with 10 datasets, in order to minimise loss of data (White et al., 2011). Predictive mean matching (pmm) was used for numerical variables, logistic regression (logreg) for categorical variables with 2 levels, and polynomial regression (polyreg) for categorical variables with more than 2 levels.

Table 2
Descriptive statistics of all study variables (N = 1,101).

Measures	Frequency	Mean	Median	SD	Range (min–max)	
EC, age 4		4.0	4.00	0.4	2.42 (2.58–5)	
Adversities	Death of someone close	No – 446	0.6	1	0.5	1 (0–1)
	Refugee because of being threatened	Yes – 655 (59.5 %) No – 1066	0.0	0	0.2	1 (0–1)
	Victim of violence or other criminal actions	Yes – 35 (3.18 %) No – 1020	0.1	0	0.3	1 (0–1)
	Mental, physical, or sexual abuse	Yes – 81 (7.36 %) No – 964	0.1	0	0.3	1 (0–1)
	Bullying or harassment	Yes – 137 (12.4 %) No – 954	0.1	0	0.3	1 (0–1)
	Serious financial problems, bankruptcy.	Yes – 52 (4.72 %) No – 1049	0.1	0	0.2	1 (0–1)
	No food or home for a period	Yes – 31 (2.82 %) No – 1070	0.0	0	0.2	1 (0–1)
	<i>Summative score</i>		1.0	1	1.1	6 (0–6)
	<i>Threshold</i>					
	0	376 (34.2 %)				
	1	471 (42.8 %)				
2+	254 (23.1 %)					
Socioeconomic risk		0.5	0	0.8	4 (0–4)	
Gender	Boy (1)	564 (51.2 %)	1.5	1	1 (1–2)	
	Girl (2)	537 (48.8 %)				
Close-aged older sibling	No (0)	669 (60.8 %)	0.4	0	0.5	1 (0–1)
	Yes (1)	432 (39.2 %)				
Maternal age (years)		30.9	31	4.9	29 (16–45)	

2.4.2. Operationalisation of adversity

The seven stressful life events were entered for analyses individually, but a summative (cumulative) score was also created by summing the seven events. To test for threshold effects, a categorical variable was further created with 3 levels: 0 adversity, 1 adversity, and 2 + adversities. This variable was dummy coded before entered in regression models. Factor analysis was also conducted as an attempt to extract types of adversity from the 7 adversities, but no clear factor solution emerged (Appendix E). Given the number of regression models fitted (20 linear models (10 unadjusted and 10 adjusted) and 20 logistic models (10 unadjusted and 10 adjusted) we performed a correction of statistical level ($0.05/40 = 0.00125$). Therefore, only effects at $p < 0.001$ were accepted as statistically significant.

3. Results

3.1. Descriptive analyses and correlations

Descriptive data for all variables are displayed in Table 2. As can be seen, the average EC score was relatively high (3.95 out of 5), with the distribution being negatively skewed (-0.25). Mothers had experienced one adverse event on average by the time their child was aged 4. Death of someone close had been experienced by more than half of the mothers, but other adversities, such as being a refugee or experience of hunger/homelessness, were less common.

Next, correlations were run between all study variables, see Table 3 for the correlation matrix. Socioeconomic risk was associated with the summative score of adversity ($r = 0.24, p < 0.001$), and female gender was associated with EC, $r = 0.22, p < 0.001$. In terms of individual adversities, six were associated with socioeconomic risk at $p < 0.001$: refugee ($r = 0.12$), violence ($r = 0.18$), abuse ($r = 0.16$), bullying/harassment ($r = 0.18$), serious financial problems ($r = 0.17$), and hunger/homelessness ($r = 0.15$).

3.2. Regression models

As explained, we operationalised adversity in three different ways, and below we present the results of each approach separately.

(a) Summative score (cumulative risk model)

The unadjusted regression model testing the effect of the summative score of adversity on child EC (Table 4) produced nonsignificant results, meaning that the sum of adversities experienced by the mother did not predict child EC. After adjusting for covariates (socioeconomic risk,

Table 4

Regression coefficients of summative score of adversity on child EC, before (Model 1) and after (Model 2) adjustment for covariates.

Predictor	β	SE	t-value	p-value	Adjusted R2
<i>Model 1</i>					
Adversity sum score	0.02	0.01	1.40	0.16	0.0009
<i>Model 2</i>					
Adversity sum score	0.03	0.01	2.36	0.02*	0.06
Socioeconomic risk	-0.05	0.02	-3.31	< 0.001***	
Female	0.19	0.02	7.98	< 0.001***	
Close-aged sibling	-0.05	0.03	-1.78	0.08	
Mother's age	0.00	0.00	0.10	0.92	

**p < 0.01.

* p < 0.05.

*** p < 0.001.

gender, presence of close-aged sibling, mother's age), socioeconomic risk and male gender were associated with lower EC ($\beta = -0.05, p < 0.001$ and ($\beta = -0.19, p < 0.001$) respectively.

(b) Individual adversities (specific risks model)

The seven adversities reported by the mother were then entered together in a regression model (Table 5). Different adversities had differential effects on child EC. In the unadjusted model, no single adversity predicted child EC. The adjusted R-squared value of the overall model was 0.016, meaning that it explained only 1.6 % of the variance in child EC. After adjusting for covariates, only male gender ($\beta = -0.19, p < 0.001$) was related to lower EC. The model accounted for 7.2 % of the variance in child EC ($R^2 = 0.072$).

Subsequently, seven separate models, each modelling one adverse life event, were run to predict child EC (Appendix C). None of the seven unadjusted models produced effects. R^2 of these models was below < 0.006, i.e. accounting for less than 1 % of the variance in EC. In the adjusted models, only gender was a significant predictor.

(c) Threshold effects

The categorical variable of adversity (0, 1, 2 + adversities) was then entered in a regression model (Table 6), with 0 adversity as the reference group. In the unadjusted model, there was no significant difference between the 1 and 0 adversity groups, or between the 2 + and 0 adversity groups. After adjustment for covariates, again, socioeconomic risk ($\beta = -0.05, p < 0.001$) and male gender ($\beta = -0.19, p < 0.001$) were inversely related to child EC. Surprisingly, the (positive) coefficient for 2 + adversities became significant in this adjusted model, possibly due

Table 3

Pearson's correlations of main study variables (1-9) and covariates (10-13).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. EC score		0.07*	0.07*	-0.02	0.06	0.07*	-0.01	-0.03	0.04	-0.06*	0.22**	-0.5	-0.01
2. Adversity summative score	0.07*		0.66**	0.36**	0.56**	0.62**	0.55**	0.34**	0.36**	0.24**	0.02	-0.03	-0.06*
3. Death of someone close	0.08*	0.66**		0.07*	0.14*	0.15**	0.15**	0.06	0.10**	0.03	0.02	0.04	0.01
4. Refugee	-0.02	0.36**	-0.07*		0.21**	0.17**	0.14**	0.00	0.18**	0.12*	-0.02	-0.02	-0.03
5. Victim of violence/crime	0.06	0.56**	0.14**	0.21**		0.35**	0.19**	0.12**	0.22**	0.18**	0.02	-0.04	-0.06
6. Mental/physical/sexual abuse	0.07*	0.56**	0.15**	0.17**	0.35**		0.16**	0.18**	0.21**	0.16**	0.04	-0.04	-0.04
7. Bullying/harassment	-0.01	0.55**	0.15**	0.14**	0.19**	0.16**		0.09**	0.08**	0.18**	0.01	-0.06	-0.09**
8. Serious financial problems	-0.03	0.34**	0.06	0.00	0.12**	0.18**	0.09**		0.05	0.18**	-0.00	-0.05	-0.00
9. Hunger/homelessness	0.04	0.36**	0.10**	0.18**	0.22**	0.21**	0.08**	0.05		0.15**	0.00	-0.02	-0.04
10. Socioeconomic risk	-0.06*	0.24**	0.03	0.12**	0.18**	0.16**	0.18**	0.17**	0.15**		-0.01	-0.08**	-0.24**
11. Female	0.22**	0.02	0.02	-0.02	0.02	0.04	-0.01	-0.00	0.00	-0.01		0.00	0.00
12. Close-aged sibling	-0.05	-0.03	0.04	-0.02	-0.04	-0.04	-0.06	-0.05	-0.02	-0.08**	0.00		0.19**
13. Maternal age	-0.01	-0.06*	0.01	-0.03	-0.06	-0.04	-0.10**	-0.00	-0.04	-0.24**	0.00	0.19**	

* p < 0.05.

** p < 0.01.

Table 5
Regression coefficients of individual adversities on child EC, before (Model 1) and after (Model 2) adjustment for covariates.

Predictor	β	SE	t-value	p-value	Adjusted R2
Model 1					
Death of someone close	0.05	0.03	2.00	0.05*	0.016
Refugee	-0.22	0.08	-2.96	0.00**	
Victim of violence/crime	0.08	0.05	1.47	0.14	
Mental/physical/sexual abuse	0.11	0.04	2.60	0.01**	
Bullying/harassment	-0.04	0.04	-1.17	0.02	
Serious financial problems	-0.13	0.06	-2.12	0.03*	
No food/home for a period	0.01	0.08	0.12	0.91	
Model 2					
Death of someone close	0.05	0.03	2.07	0.04*	0.072
Refugee	-0.17	0.07	-2.33	0.02*	
Victim of violence/crime	0.08	0.05	1.47	0.14	
Mental/physical/sexual abuse	0.10	0.04	2.45	0.01*	
Bullying/harassment	-0.03	0.04	-0.78	0.44	
Serious financial problems	-0.09	0.06	-1.50	0.13	
No food/home for a period	0.05	0.08	0.65	0.52	
Socioeconomic risk	-0.04	0.02	-2.82	0.00**	
Female	0.19	0.02	7.67	< 0.001***	
Close-aged sibling	-0.05	0.03	-1.92	0.05	
Mother's age	0.00	0.00	0.01	0.99	

* p < 0.05.
** p < 0.01.
*** p < 0.001.

Table 6
Regression coefficients of thresholds of adversity on child EC, before (Model 1) and after (Model 2) adjustment for covariates.

Predictor	β	SE	t-value	p-value	Adjusted R2
Model 1					
1 adversity	0.03	0.03	1.00	0.32	0.005
2 + adversities	0.09	0.03	2.63	0.01	
Model 2					
1 adversity	0.04	0.03	1.27	0.20	0.067
2 + adversities	0.11	0.03	3.32	< 0.001***	
Socioeconomic risk	-0.05	0.02	-3.46	< 0.001***	
Female	0.19	0.02	7.91	< 0.001***	
Close-aged sibling	-0.04	0.03	-1.75	0.08	
Mother's age	0.00	0.00	0.14	0.89	

*p < 0.05. ** p < 0.01.
*** p < 0.001.

to suppression. The model accounted for 6.7 % of the variance in EC ($R^2 = 0.067$).

3.3. Supplementary analysis

As discussed, logistic regression models after a median split on the EC score were also fitted. As in the multiple linear regression models, summative scores and threshold specifications of adversity, as well as specific events, were all examined. Results were similar to those obtained via the linear regression models (Appendices C and D), although the apparent suppressor effects in the threshold specification was not evident in the logistic model. This suggests that when 1 and 2 + adversities were compared to 0 adversity and covariates were considered, only male gender and socioeconomic risk were associated with low EC. We then attempted to cluster the seven adversities, but a factor analysis yielded no clear solution (Appendix E for the exploratory factor analysis

results).

4. Discussion

The primary objective of the present study was to examine the impact of maternal history of adversity on offspring effortful control (EC) at preschool age in a Norwegian general population sample. Despite the consensus in the existing literature that maternal adversity negatively impacts child EC, this was not evident in our sample. Socioeconomic risk and being male were clearly associated with lower EC, in accordance with previous findings. In fact, maternal lifetime exposure to adversity was not related to child EC, even before adjusting for covariates. This was the case in the cumulative risk model (when the summative score of adversity was used), the threshold model and the specific events model. We think that this may be due to lack of information about the timing, chronicity and impact of the stressors we examined (Smith & Pollak, 2020), in turn reducing our ability to capture their 'true' risk effects (Plamondon et al., 2022). For example, maternal lifetime experience of serious financial problems or bankruptcy was not related to child EC at age 4 years in our sample, even though socioeconomic risk as measured in the child's first year of life was. Arguably, experiences of financial hardship could have taken place at any point in the mother's life, whereas current or recent socioeconomic risk likely reflects accurately the child's direct exposure to socioeconomic disadvantage. As another example, abuse in early childhood may have a stronger impact than at later ages (Kaplow & Widom, 2007; Keiley et al., 2001), but we did not have information about the timing of abuse for those who reported such an experience. Moreover, the adverse event's perceived impact, also not assessed, may play a critical role in how the event may produce outcomes. In our data, for example, almost 60 % of mothers had experienced bereavement, but the psychological impact of bereavement may differ greatly between individuals. We must also note, however, that although the impacts of socioeconomic risk and gender on EC were clearly stronger than that of maternal lifetime adversity exposure, they were still small, suggesting that other influences (environmental and genetic) are at play. Early childhood is characterised by rapid developmental changes, and a great number of factors may affect EC growth.

4.1. The importance of context

Country context may play a significant role, too. A recent study, for example, suggested clear differences in the determinants of EC between Norway and the US (Lenes et al., 2020). That study focused on self-regulation, which includes EC as well as more general self-regulatory capacities like emotion regulation. Although children across the two samples had similar levels of self-regulation, low maternal education did not predict self-regulation in children in the Norwegian sample, even though it was a strong predictor for the US sample. These differences may be related to the organisation of the two countries' childcare policy systems. As Norway's ECEC system is heavily subsidised, families only pay 14 % of their annual expenditure in ECEC (Lunder & Eika, 2019). All children under the age of 5 are entitled to attend a publicly subsidised kindergarten, and most children go full time. Enrolment is very high, at 93.4 % for 1-to-5-year-olds, and 97.2 % for 5-year-olds (Haraldsrud et al., 2023). The play-based approach in the Norwegian ECEC system also fosters EC development, as children's engagement in active, meaningful play (e.g., pretend play) with peers creates opportunities for them to learn to inhibit their normal impulses and to act and adapt to play situations accordingly (Thibodeau-Nielsen et al., 2020). The Norwegian Playful Learning Curriculum also includes a core component on self-regulation that includes games fostering behavioural inhibition, a key aspect of EC (Størksen et al., 2023).

Perhaps due to Norway's ECEC system, therefore, the impact of family adversity on EC among young children may not be as pronounced as in other contexts. Future studies should thus consider the impact of context on the relationship between family risk and early child

outcomes, as well as the role of high-quality childcare and education in buffering the effect of such risk (Green et al., 2021; Zachrisson & Dearing, 2015). For example, a study of child EC across countries with varying levels of ECEC provision could be conducted to gauge any protective effects of quality childcare on early development. Although there was no impact of maternal lifetime stressor exposure on child EC in this sample, there may be a marked effect in other populations.

4.2. Limitations

As mentioned, information about the timing, chronicity, and perceived impact of the seven experiences, not available in our data, could be critical. It would also be important to have data on parents' own effortful control to adjust for in the analysis. Another study limitation is the potential for same-source method bias, as both child EC and maternal adversity were generally reported by the mother. Related to this, although EC has been shown to be reliably measured by parental reports on the VSF-CBQ (de la Osa et al., 2014; Putnam & Rothbart, 2006), it would be important to consider multi-informant assessments (Kerr et al., 2007) and use of objective behavioural tasks (Kochanska et al., 1996), especially in view of the evidence for significant divergence between parent and preschool teacher reports on the VSF-CBQ (Allan et al. (2013).

4.3. Summary

The present study investigated the role of maternal lifetime experience of adversity in four-year-olds' effortful control (EC). We used data from a large Norwegian longitudinal sample to examine the role of maternal lifetime stressor exposure in parent-reported EC, independently of sociodemographic and family characteristics. Contrary to our hypotheses, there was no impact of maternal lifetime adversity exposure on child EC. Socioeconomic risk and gender were far stronger predictors than maternal history of adversity. Further research should explore the role of timing, chronicity and severity of adversity exposure. It should also consider the potential protective role of childhood education and care systems for EC early in development. In terms of implications, this study clearly suggests that reducing poverty and socio-economic disadvantage could improve young children's ability to regulate their behaviour, emotion and cognition. An appropriate policy response therefore would be to directly target families with young children who seem to struggle financially. As we have shown, these families appear to be at risk of poor child outcomes irrespective of their history of adversity.

Authors' Contributions

JL: data analysis, writing up. HJ data procurement and support. AN data procurement and support. EF: study conception, project management, supervision, writing up.

Availability of Data and Materials

The data supporting the findings of this study are available from the Behavior Outlook Norwegian Developmental Study (BONDS). Restrictions apply to the availability of these data, which were used under license with approval from the Norwegian Centre for Child Behavioural Development. Data are only available to researchers by direct application.

Ethical approval

The current study involved only secondary data from the original BONDS, in which all participants provided informed written consent to take part. BONDS received ethical approval from the Regional Committee for Medical and Health Research Ethics and the Norwegian Data

Inspectorate. NCCBD approved and provided data for this project. Due to its sensitive nature of the data used, the author used the University of Oslo's TSD platform to access and analyse data securely, and no analysis could be conducted outside of this platform. The data were fully anonymised with no identifying information.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chilyouth.2025.108147>.

Data availability

The authors do not have permission to share data.

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