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More Than Just Treats? Effects of Grandparental Support for Children Growing up in Adversity

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ABSTRACT: This study examined whether grandparental support is a protective factor for children's socio-emotional development in the context of adversity. Using longitudinal data from the Millennium Cohort Study, we investigated the effects of grandparental support across development in children with and without adverse childhood experiences (ACEs). Socio-emotional development was assessed with the Strengths and Difficulties Questionnaire when children were aged 3 years (N = 10,186), 5 years (N = 10,412) and 7 years (N = 10,551). Parent-reported grandparental childcare, coresidence and financial help were assessed and parents reported on the occurrence of five ACEs: physical and emotional abuse assessed with the Straus' Conflict Tactics Scale, parental mental illness assessed with the Kessler scale, domestic violence and parental separation. We found that children with relatively higher levels of ACEs showed more prosocial behaviour and less externalizing problems when they received grandparental care compared to non-grandparental (in)formal care, but only at age 3. By age 7, children with higher levels of ACEs receiving grandparental care showed less prosocial behaviour and more externalizing problems. In addition, grandparental financial support at age 3 was related to more externalizing problems. Post-hoc analyses showed that internalizing and externalizing behaviours at age 5 were related to an increased probability of grandparental childcare at age 7, indicating that children's socio-emotional problems trigger grandparental support. Our findings point to a protective effect of grandparental care on children's socio-emotional development at age 3. Our results highlight the importance of going beyond the nuclear family towards the impact of the wider family network when examining children's socio-emotional development.

Research Highlights:

- Three-year-old children with high levels of adverse childhood experiences (ACEs) show more prosocial behaviour and less externalizing behaviour when they receive grandparental care.
- Grandparental care has therefore protective effects on young children's socio-emotional development in the context of family adversity.
- Grandparents respond to children's socio-emotional problems and family adversity by increasing financial support and involvement in care.

- These findings underscore the importance of going beyond the nuclear family towards the impact of the wider family network when examining children's socio-emotional development.

1 | Introduction

Children's experiences in their early caregiving environment are significant for their development and overall wellbeing across the life course (Black et al. 2017; World Health Organization et al., 2018). Most studies have primarily focused on the importance of maternal care in early childhood development, and more recently, on father involvement, yet caregiving is not restricted to parents. A wider network of grandparents, relatives, friends, neighbours and teachers usually surround and support the parental dyad, especially in low- and middle-income countries (Aubel 2021; Tendulkar et al. 2012.). Despite this, research on children's relationships, which has overwhelmingly been conducted in high-income settings, has paid much less attention to the role of these caregivers within broader family systems. In the present study, we focus on grandparental support, which is especially relevant nowadays given rises in life expectancy, dual parental employment, economic stressors and divorce (Buchanan and Rotkirch 2018; Thomese and Liefbroer 2013). Evidence from across the world suggests that child care by grandparents has become more common throughout the years (Buchanan and Rotkirch 2018; Geurts et al. 2015). In the United States, the level of co-residence has also risen, going from 7% in 2011 to 27% in 2021 (Generations United 2021, https://www.gu.org/). Despite the increasing involvement of grandparents in families' lives, our understanding of the role grandparents play in child development is limited.

Grandparents play an essential role in assisting and supporting younger generations within families in various ways, including participating in child-rearing practices, maintaining regular contact with grandchildren and offering financial support (Sadruddin et al. 2019). Grandparental support may particularly benefit parents with young children, who usually encounter a load of social, financial and childcare responsibilities (Mistry et al. 2007). For example, previous research has found that grandparental support reduces the risk of caregiving burden, parental mental health problems and harsh parenting among Chinese parents (e.g., Goh and Kuczynski 2010; Guo et al. 2022; Riem et al. 2021). These grandparental contributions can be explained from an evolutionary perspective in which humans are characterized as cooperative breeders (Hawkes 2004; Hrdy 2009). As human parenting is intensive and requires huge investment during a long period of childhood, the theory posits that mothers do not only need fathers to raise their children but also support from the wider family network, in particular from grandparents (Hrdy 2009). Grandparental support 'lightens the reproductive load' and allows parents to reproduce earlier, more frequently and more successfully (Lahdenperä et al. 2004). In fact, anthropology research suggests grandparental childcare may have evolutionary benefits and is particularly important for supporting mothers with young children in the post-weaning phase (Hawkes 2004; Hrdy 2009). For that reason, there has been a recent shift in the evolutionary behavioural sciences towards the idea that human parenting is cooperative, and that mothers do not rear children on their own but need help from others to raise children successfully (Sear 2016). This shift is, however, not yet reflected in psychological models of parenting that consider the nuclear family as normative. Nevertheless, research investigating the association between grandparental support and child mental health in contemporary, high-income countries is limited and mostly focused on adolescent populations, despite evidence that the involvement of grandparents tends to decline as children grow up (Bridges et al. 2007; Silverstein and Marenco 2001; Tan et al. 2010).

Importantly, grandparents are often the first to take on child caregiving responsibilities in response to family problems. For example, grandparents offer help to single mothers, or assistance in adverse conditions such as, parental incarceration, substance abuse, divorce and unemployment (Fuller-Thomson and Minkler 2001; Gorman and Braverman 2008; Hayslip, Blumenthal, and Garner 2014; Smith et al. 2018). Grandparental support may, thus, play a significant role, especially in times of need, when children grow up in an adverse family environment. However, empirical evidence on whether support from grandparents can mitigate the impacts of childhood adversity on children's mental health is lacking. This study examines the role of grandparental support as a promotive or protective factor facilitating children's socio-emotional adjustment and buffering (i.e., reducing) the effects of adverse childhood experiences (ACEs) on adjustment problems. Early adversity is associated with a higher risk of negative long-term physical and psychological outcomes (Shonkoff et al. 2012); therefore, identifying protective and promotive factors is vital for understanding how to help children achieve their potential in a context of adversity, as well as to inform caregiving policies on the prevention of destructive impacts on children (Zimmerman et al. 2013).

1.1 | Benefits of Grandparental Support on Children's Mental Health

The Intergenerational Family Solidarity Model describes how family members of different generations relate to, assist, and count on one another in their daily lives (Bengtson and Roberts 1991; Silverstein, Giarrusso, and Bengtson 1998); thus, it can serve as a theoretical framework linking grandparental support with child mental health outcomes. Grandparental support is central to three interdependent conceptual dimensions of solidarity: associational solidarity, opportunity structure and functional solidarity (Silverstein, Giarrusso, and Bengtson 1998). Associational solidarity refers to the regularity of social contact between family members. Opportunity structure concerns the conditions that may facilitate or impede interaction between family members, such as residential proximity and co-residence. For example, it is easier for grandparents to contact their grandchildren and provide support if they live nearby or in the same house (Dunifon,

Ziol-Guest, and Kopko 2014; Vandell et al. 2003). Finally, functional solidarity refers to offering practical support and monetary help. In line with the Intergenerational Family Solidarity Model, prior research has shown that grandparents often contribute by looking after their grandchildren (Fuller-Thomson and Minkler 2001; Hank and Buber 2009; Luo et al. 2012) and/or offer financial support with costs for child-raising, such as treats or household costs (Bordone, Arpino, and Aassve 2017; Dimova and Wolff 2011).

In addition to these practical forms of support, grandparents may take on various roles such as secondary caregivers and emotional support resources for their offspring, act as role models (Coall and Hertwig 2010) or function as an attachment figure (Liang et al. 2021), all of which have positive outcomes for grandchildren's mental health and development. Accordingly, grandparental promotive effects on children's mental health can be direct, resulting from interactions in which grandparents serve as positive role models and/or attachment figures who transmit values and help children regulate their emotions and behaviours (Rueger et al. 2016), and indirect, mediated by other means such as parental behaviour and wellbeing (Attar-Schwartz and Buchanan 2018).

Tinsley and Parke (1987) were among the first to demonstrate that more frequent intergenerational contact with grandparents facilitates infant mental development. More recent studies have distinguished between different forms of grandparental support and demonstrated that helping with childcare is associated with better early social and communication development (at age 9 months and 3 years) (Cruise and O'Reilly 2014; Hansen and Hawkes 2009), and providing additional support to their offspring (i.e., emotional and instrumental support, contact frequency and financial support) is also associated with better cognitive, socio-emotional and physical child outcomes (Scelza 2011; Tanskanen and Danielsbacka 2018). Another study exploring parent-grandparent coparenting in China has found that in families where mothers and grandparents share the parental responsibilities harmoniously, mothers tend to feel more capable in their parenting role. In turn, their children are more socially competent 6 months later (Li and Liu 2019). Furthermore, several studies have demonstrated concurrent and longitudinal positive associations between various parameters of grandparental support and prosocial behaviour (Attar-Schwartz, Tan, and Buchanan 2009; Profe and Wild 2017; Van Heerden and Wild 2018; Yorgason, Padilla-Walker, and Jackson 2011), as well as negative associations with internalizing and externalizing problems in middle childhood and adolescence (Attar-Schwartz, Tan, and Buchanan 2009; Hamilton 2005; Levetan and Wild 2016).

Nevertheless, a closer look at the existing literature reveals some gaps and shortcomings as the findings seem to depend on the particular outcome being assessed and other factors such as the gender and lineage of grandparents (Wild and Gaibie 2014), type of grandparental childcare involvement (e.g., custodial grandparenting, coparenting in three-generation households or temporary childcare) (Smith and Wild 2019), and ethnicity (Pilkauskas 2014). For example, studies reveal that living with a single mother *and* a grandparent is associated with better educational child outcomes than living with a single parent alone among White children, but worse educational child outcomes for children with an African-American background (Dunifon, and Kowaleski-Jones 2007). In contrast, another study showed that grandparental coresidence has been associated with *more* externalizing behaviour, for White children, but *less* externalizing behaviour for Hispanic children or children with an African-America background (Pilkauskas 2014). Besides, positive associations between grandparental childcare support and child socio-emotional wellbeing outcomes have not been observed across all studies. For instance, some findings indicate that greater grandparent involvement in childcare is associated with more peer difficulties and hyperactivity problems in early childhood (Fergusson, Maughan, and Golding 2008; Hansen and Hawkes 2009). However, we cannot draw causal inferences from cross-sectional findings as it is possible that grandparental support follows rather than precedes poor child outcomes. The observed child behavioural problems may be attributable to variations in the types of families using grandparent care (Hunt, Slack, and Berger 2017), as families of children with problem behaviours or other family stressors may need additional support from grandparents. Similarly, families with children with high levels of prosocial behaviour may receive more grandparental childcare support, because these may be more pleasurable to be with. Hence, there is an urgent need for longitudinal design when examining the effects of grandparental care.

1.2 | Can Grandparents Protect Children in the Face of Adversity?

For many families, difficult or unpleasant situations may arise that are deleterious for children's mental health and wellbeing. Adverse experiences in the family environment demand the child to show significant psychosocial and neurodevelopmental adaptation outside of the average expectable environment (Lacey and Minnis 2020). Conventional examples of ACEs include child maltreatment (e.g., physical abuse, sexual abuse, emotional abuse, physical neglect and emotional neglect) and household dysfunction (e.g., parental substance abuse, severe mental illness, domestic violence, incarceration/jail and divorce/separation) (Mersky, Janczewski, and Topitzes 2017). According to the diathesis-stress model (Monroe and Simons 1991), early ACEs induce stable inadequacies in coping skills, which render individuals vulnerable to psychopathology. ACEs may also result in social thinning, that is, an attenuation in the number and quality of relationships over time, which gradually impoverish an individual's social environment and ultimately increases psychiatric risk (McCrory, Foulks, and Viding 2022). Consistent with these models, a higher number of ACEs is associated with worse mental health and prosocial outcomes in childhood and adolescence (Bevilacqua et al. 2021; Black et al. 2002; Nowakowski-Sims and Rowe 2017; Tzavidis et al. 2016), as well as increased stressors and reduced wellbeing later in life (Mc Elroy and Hevey 2014). Experiencing ACEs without sufficient social support may thus undermine children's ability to develop adequate psychosocial resources and adaptive coping mechanisms (Slavik and Croake 2006).

Grandparental support may buffer the detrimental impact of ACEs. Grandparents can take on the role of safeguards or mediators during adversity, for example, providing stability and support in families and negotiating relationship difficulties between parent and grandchild (Bengtson 2001; Coall and Hertwig 2010; Werner et al. 2005). Hence, support from grandparents could

enhance parental and child resilience in the face of adversity by providing emotional and stimulating resources that may reduce perceptions of threat, increase the use of effective coping strategies (Southwick et al. 2016) and enhance children's socio-emotional skills (Sadruddin et al. 2019).

Prior research has shown that grandparents can serve as an essential protective resource for their offspring and grandchildren under adverse conditions, such as teenage pregnancy or maternal depression (Coall and Hertwig 2010). Additionally, results from a recent study have shown that in high-adversity family environments, the quality of grandparent-grandchild relationship had a protective effect against peer problems for female adolescents (Yang and Wild 2022). Furthermore, empirical studies with samples of custodial grandparents, divorced families or single-parent families have shown that grandparents tend to play a linking or mediating role between generations, which in turn can reduce adjustment difficulties among adolescents (Attar-Schwartz, Tan, and Buchanan 2009; Lussier et al. 2002). Emotional closeness to the most significant grandparent can also provide a buffer against the negative impact of ACEs experienced during the last year on adolescent mental health (Flouri et al. 2010). Nevertheless, findings are not entirely consistent. Some studies have indicated that grandparental care in skipped-generation households did not buffer children from adverse outcomes and instead was associated with elevated internalizing and externalizing behaviour problems (Edwards 2006; Kelley, Whitley, and Campos 2011).

1.3 | The Present Study

This study investigated whether grandparental support is a protective factor for children's socio-emotional functioning in the context of family adversity. Most prior studies on this topic have used cross-sectional data (e.g., Attar-Schwartz, Tan, and Buchanan 2009) and few examined grandparental support in longitudinal samples (e.g., Yorgason, Padilla-Walker, and Jackson 2011), which prevents looking into changes in the effects of grandparental support across developmental stages. More specifically, according to our knowledge, this is the first longitudinal study examining the effects of grandparental care for children growing up in adversity. Although some longitudinal studies examined grandparent effects in at-risk samples, such as adolescent mothers (Seay et al. 2016) or families with low socio-economic status (Pittman 2007), there is a lack of longitudinal research on benefits of grandparental care in the context of adversity compared to no adversity. To provide more insight into the promotive or protective effects of grandparental support on children's mental health across early childhood, we used longitudinal data from the Millennium Cohort Study between ages 3 and 7 years. We focused on children's prosocial behaviour, as well as internalizing and externalizing behaviour outcomes (Goodman, Lamping, and Ploubidis 2010), because healthy socio-emotional functioning in early childhood is a critical predictor of later school and social adjustment, as well as overall wellbeing in adulthood (Collie et al. 2019; Denham et al. 2012; Hammer, Melhuish, and Howard 2017; Jones, Greenberg, and Crowley 2015; Nakamichi, Nakamichi, and Nakazawa 2019). The following hypotheses were examined: (1) Support from grandparents (i.e., support with caregiving, financial support and co-residence) will be related to decreased internalizing and externalizing problems and increased prosocial behaviour among children with and without ACEs; (2) Support from grandparents will be particularly beneficial for young children and (3) Grandparental support will moderate (weaken) the link between ACEs and children's socio-emotional outcomes.

2 | Methods

2.1 | Sample and Design

We used data from the Millennium Cohort Study (MCS), a nationally representative longitudinal study of children born in the United Kingdom between September 2000 and January 2002. The MCS was designed to represent children from all UK countries (England, Wales, Scotland and Northern Ireland) and over-sampled respondents from areas that are often underrepresented in cohort studies, such as ethnic minorities in England and those living in more deprived neighbourhoods (for more details see Connelly and Platt 2014). Data were collected with survey interviews carried out at home with children's parents or parental figures. The primary respondents are, in the majority of cases, the biological mothers of the cohort children, whereas partner respondents are generally the biological fathers or the mothers' new partners. The main and partner respondents were interviewed separately.

We examined data from survey Sweeps 2, 3 and 4, when the children were aged 3 years ($n = 15{,}590$), 5 years ($n = 15{,}246$) and 7 years ($n = 13{,}857$), resulting in a sample of 11,853 children who took part in every sweep (61% of the total sample). First, similar to previous MCS studies (e.g., Heikkilä et al. 2011) we excluded 284 (2%) families with twins and triplets because grandparents' role and impact might be different when more children of the same age have to be cared for. Moreover, the behavioural development of twins and triplet differs from singleton children (Feldman and Eidelman 2005; Sutcliffe and Derom 2006). Second, similar to previous MCS studies (e.g., see Hope et al. 2014) we excluded 1084 (9%) families in which there has been a change in the identity of the person responding as main parent at one or more of the sweeps to avoid having an inconsistent rater of the child outcomes. We selected children who had information about child care for all three sweeps, resulting in 10,769 families. After removing missing values on all dependent variables, a total of 10,186 children at Sweep 2, 10,412 at Sweep 3 and 10,551 at Sweep 4 remained (for a flow diagram, see Figure S1 and Table S2 for information about missing data). The number of unique family IDs across the three sweeps was 10,561.

Ethical approval was received from a Research Ethics Committee at each study sweep. Secondary data analyses do not require additional ethics approval. Data were obtained from UK Data Archive, University of Essex in August 2021. Further information about the MCS can be found elsewhere (http://www.cls.ioe.ac.uk/MCS).

2.2 | Measures

2.2.1 | Child Socio-Emotional Behaviour

Socio-emotional behaviour was assessed at Sweeps 2–4 (age 3–7) using the Strengths and Difficulties Questionnaire (SDQ;

Goodman 1997), a 25-item measure completed by the main parent. The SDQ contains five hypothesized subscales: emotional problems, conduct problems, hyperactivity-inattention problems, peer-relationship problems and prosocial behaviour. Each subscale includes five items with 3-point Likert scales (0 = *not true*, 1 = *somewhat true*, 2 = *certainly true*). In general population samples, there is theoretical and empirical support for using a broader three-subscale division comprising internalizing behaviours (sum of emotional and peer subscales), externalizing behaviours (sum of conduct problems and hyperactivity subscales) and prosocial behaviour (Goodman, Lamping, and Ploubidis 2010). The internalizing and externalizing subscales have a score range of 0–20, with higher values indicating more problems. The prosocial subscale is scored on a 0–10 scale, with higher values indicating higher levels of prosocial behaviour. The subscales indicated good internal reliability at all survey sweeps with Cronbach's alpha values ranging from 0.82 to 0.85 for internalizing behaviours, 0.75–0.84 for externalizing behaviours and 0.87–0.90 for prosocial behaviour.

2.2.2 | Adverse Childhood Experiences

Based on the original (and extended) classification of ACEs (Anda et al. 1999; Felitti et al. 1998), we included information on five parental reported ACEs that were captured consistently across the study sweeps: physical abuse, emotional abuse, parental mental illness, domestic violence and divorce/separation. Items from the Straus' Conflict Tactics Scale (Straus and Hamby 1998) were administered to the main respondents to assess child maltreatment at ages 3, 5 and 7. Although the full version of the scale was not used in the MCS, there were two items ('How often shouts at child when naughty' and 'How often smacks the child when naughty') measuring emotional abuse and physical abuse, respectively (Straus and Hamby 2014). Responses were coded on a 5-point scale (1 = *never*, 2 = *rarely*, 3 = *once a month*, 4 = *once a week or more*, 5 = *daily*). To indicate whether the child experienced maltreatment, each variable was dichotomized into (0 = *never to rarely*, 1 = *once a month to daily*). The Kessler scale (6 items), a brief valid screen assessing non-specific psychological distress indicating the presence of serious mental illness (K6; Kessler et al. 2003), was administered to both the main and partner respondents at Sweeps 2–4 (age 3–7) to assess parental mental health in the last month. The total K6 score ranges between 0 and 24, with higher scores indicating higher levels of psychological distress. To indicate whether either the main or the partner respondent was likely to be suffering from serious mental illness we used the validated cut-off score of 13 or higher (Furukawa et al. 2003; Kessler et al. 2003, 2010). Domestic violence was measured at Sweeps 2–4 using information on whether either parent has ever used force against their partner. To identify an occurrence of divorce/legal separation across all sweeps we used data regarding the main respondent's relationship status, which was dichotomized into divorced/legally separated/widowed versus single/married/cohabitating. Although it has been suggested that divorce may not be a strong predictor of problematic child development as it has become more widespread (Finkelhor et al. 2015), the majority of previous studies on the effects of ACEs on health still consider it an adverse event (Hughes et al. 2017). Death of parent could have been added as a separate potential indicator of adversity, but because there were not many widowed respondents (around 0.4% of the total sample) it was included in parental separation.

A cumulative ACE score was constructed by summing the binary values for each individual ACE to create a total score. This total score represents the total number of adversities experienced by a child at each sweep, with a score range of 0–5 for Sweeps 2–4. This is a commonly used approach in ACE research despite its known limitations: it assumes that each adversity has the same association with the outcomes, and fails to consider which adversities tend to co-occur and how they can differentially predict outcomes (Lacey and Minnis 2020). For the purposes of the current study, and given the rarity of some of the ACEs considered, we opted to use a cumulative index.

2.2.3 | Grandparental Support

2.2.3.1 | Co-Residence. This variable was derived from the household composition information, collected at Sweeps 2–4, to indicate if there are any grandparents (maternal or paternal grandparents) living in the household between the ages of 3 and 7 years. Responses were coded on a binary scale (0 = *no grandparents in the household*, 1 = *at least 1 grandparent in the household*). On average across all study sweeps, 5% of the cohort children lived in the same household with a grandparent.

2.2.3.2 | Child Care. A range of questions were asked to the main respondents at Sweeps 2–4 about the childcare choices made when they were at work or studying (where applicable), and at all other times. Information on whether any grandparent (maternal grandmother, paternal grandmother, maternal grandfather and paternal grandfather) had looked after the cohort child, between age 3 and 7 years, was used to identify any regular exposure to grandparental care. To account for the use of other types of informal childcare and/or formal childcare at the given time we created a categorical variable (1 = *Grandparental care with or without formal or other types of informal care*, 2 = *Formal or other informal care without grandparental care* and 3 = *Parental care only*). 'Informal' care was classified if the child was cared for by a friend, neighbour, other relative, older sibling and nanny/au pair; and 'formal' if they were cared for by a childminder, in a nursery or childcare centre, at work place or breakfast club. It was not possible to differentiate between the categories grandparental care only and grandparental care with other formal or informal care because of the low numbers of children in the latter two categories (grandparental care with formal care: 0, 110 and 255 at Sweeps 2, 3 and 4, respectively, and grandparental care with other informal care: 0, 518 and 373, at Sweeps 2, 3 and 4, respectively).

2.2.3.3 | Financial Help. The main and partner respondents were asked at Sweep 2 (3 years) to report whether their parents provided any financial benefits, and if yes, they were then asked: 'In what ways do they help you?' Participants' responses were coded into seven categories (does not help in any of these ways, essentials for the baby, household costs, gifts and extras for the baby, lending money, paying for childcare and other financial help). Respondents could report receiving more than one financial benefit; therefore, we computed the sum of the different financial benefits to represent the total number of financial support provided. The MCS missed approximately 20% of the

TABLE 1 | Socio-demographic characteristics of the sample of the current study, adjusted for the stratified design, attrition rate and a finite population correction factor (Sweep 2 $N = 10{,}186$).

	M (SD)	*N* (%)
Child gender (boy)		5130 (50.36)
Maternal age at birth	28.74 (6.01)	
Mother highest academic qualification*		
GCSE below grade C (NVQ level 1)[a]		1008 (11.35)
GCSE grade A-C (NVQ level 2)[b]		3397 (38.25)
A/AS Level (NVQ level 3)[c]		1041 (11.72)
Postgraduate degree or degree (NVQ level 4 or 5)[d]		3337 (37.57)
Child ethnicity		
British White		9068 (89.18)
Mixed		214 (2.10)
Indian		218 (2.14)
Pakistani and Bangladeshi		422 (4.14)
Black or Black British		184 (1.81)
Other ethnic group		80 (0.79)
No. of children in household**		
1 child		1255 (11.89)
2 children		4917 (46.60)
3 children		2905 (27.53)
≥4 children		1474 (13.97)

[a]CSE below grade 1/GCSE or O Level below grade C, SCE Standard, Ordinary grades below grade 3 or Junior Certificate below grade C.
[b]O Level or GCSE grade A–C, SCE Standard, Ordinary grades 1–3 or Junior Certificate grade A–C.
[c]A/AS/S Levels/SCE Higher.
[d]First Degree Bachelor of Arts (BA), Bachelor of Science (BSc) or equivalent, higher education, Teaching qualifications for schools, Higher Degree and Postgraduate qualifications.
*For missing data on highest Academic Qualification see Figure S1.
**Derived from Sweep 4.

partners of the main respondents therefore we only included financial help by the maternal grandparents in the analyses.

2.2.4 | Potential Confounders

We explored a range of potential confounders that were hypothesized to relate to the socio-emotional behaviour outcomes and ACEs. The parent-level controls were maternal age at birth of the cohort child and highest academic qualification (see Table 1) achieved over Sweeps 2–4. The household-level controls were the number of siblings and equivalized weekly family income (continuous). The child-level controls were ethnicity, sex, age (in years) and parent-reported child long-term illness, defined as an illness, disability or infirmity that has troubled the child over a period of time or that is likely to affect the child over a period of time.

2.3 | Statistical Analysis

Data were analysed using the R statistical software (R Core Team 2022) package survey (Lumley 2020). To take into account the unequal selection probabilities of wards and adjust for non-response, the survey design used in the analyses was specified by a number of weighting variables identifying strata within each country, different clusters (wards), attrition weights (based on Sweep 4) and a finite population correction factor (Agalioti-Sgompou and Johnson 2020; Ketende and Jones, 2011).

A generalized linear model with inverse-probability weighting, design-based standard errors and the quasi-Poisson link function was used to fit the data (function *svyglm* from package survey, Lumley 2020). A quasi-Poisson link function was used because SDQ scores were skewed discrete sumscores. Three separate analyses, with prosocial behaviour, internalizing behaviour, externalizing behaviour as dependent variables, were conducted to investigate the effects of grandparental support (co-residence, type of care, financial support) on the three child behavioural outcomes over time (between age 3 and 7 years). The effects of grandparental support were tested with the following variables: Grandparental co-residence, type of care (three categories are parental care only, formal/informal care with grandparental care and formal/informal care without grandparental care) and financial support from grandparents. These grandparent variables were entered jointly in each analysis. With regard to type of care, the reference category was 'grandparental care' because we were interested in the contrasts 'Grandparental care versus Parental care only' and 'Grandparental care versus (in)formal care without Grandparental care'. The following covariates were included: ACEs, age of the mother, academic qualification of the mother, number of siblings, family income, gender of the child, child ethnicity, child long-term illness and age of the child (in years). Interaction terms between child age, ACEs and type of childcare were included in order to examine whether the effects of grandparental care depend on age and adverse conditions. Hence, the model was a longitudinal, repeated measures model. We used the data from three sweeps collected for each individual and participant's age at the moment of testing was used as a time indicator. The interaction of time with a predictor allows us to estimate (conditional) change trajectories for the dependent variables conditional on, for example, the childcare groups and the number of ACEs. This project's open science framework page includes the R-scripts (OSF.IO/HUVGR). The general linear model we used was specifically developed to deal with complex survey designs like the Millennium Cohort Study (MCS) (see Ketende and Jones 2011), which means we took into account different clusters/strata (participants, wards), attrition weights and a finite population correction factor to estimate effects. Cohen's *d* was calculated on design-weighted means and *N*. Model-robust standard errors were computed. It should be noted that for some covariates, data was missing (Sweep 2: $N = 1713$, Sweep 3: $N = 1724$ and Sweep 3: N 1906, see Supporting Information). This mainly concerned missing information on maternal academic qualification. Analyses were therefore repeated without this covariate, yielding the same results.

The choice for incorporating the MCS complex survey design characteristics in our analyses (strata, sampling weights and finite population correction) has a consequence: The generalized linear

TABLE 2 | Prosocial behaviour, internalizing and externalizing behaviour and ACEs, adjusted for the stratified design, attrition rate and a finite population correction factor, and income, the number of cases across different types of child care, grandparental co-residence and financial support.

	Sweep 2 ($N = 10,186$)	Sweep 3 ($N = 10,412$)	Sweep 4 ($N = 10,551$)
Equivalized weekly income			
M (SE)	342.09 (6.87)	361.34 (6.42)	394.08 (5.70)
Type of care *n* (%)			
No (in)formal care no GP involvement (only parents)	4160 (40.84)	6059 (58.14)	6546 (62.04)
(In)formal care without GP involvement	3451 (33.88)	1293 (12.41)	1710 (16.21)
(In)formal care with GP involvement	2575 (25.28)	3060 (29.36)	2295 (21.75)
Co-residence grandparents (*n (%)*)			
No	9821 (96.42)	10,050 (96.44)	9888 (93.72)
Yes	365 (3.58)	362 (3.47)	663 (6.28)
Grandparental financial support[a] *n* (%)			
0	2242 (22.79)	2376 (23.39)	2430 (22.75)
1	3329 (33.85)	3420 (33.67)	3461 (33.66)
2	3468 (35.26)	3537 (34.82)	3564 (34.66)
≥3	796 (8.09)	824 (8.11)	828 (8.05)
Prosocial behaviour			
M (SE)	7.31 (0.02)	8.39 (0.02)	8.59 (0.02)
Internalizing behaviour			
M (SE)	2.82 (0.04)	2.45 (0.04)	2.72 (0.04)
Externalizing behaviour			
M (SE)	4.73 (0.05)	4.75 (0.05)	4.76 (0.05)
ACEs[b]			
M (SE)	0.96 (0.01)	1.06 (0.01)	1.05 (0.01)
Domestic violence *n* (%)	865 (8.03)	836 (7.76)	762 (7.08)
Parental mental illness *n* (%)	392 (3.70)	462 (4.29)	507 (4.71)
Divorce *n* (%)	716 (6.65)[c]	994 (9.23)	1180 (10.96)
Emotional abuse *n* (%)	6205 (57.62)	7495 (69.60)	7664 (71.17)
Physical abuse *n* (%)	1418 (13.17)	1230 (11.42)	815 (7.57)
0 ACEs *n* (%)	3283 (32.23)	2275 (21.83)	2255 (21.37)
1 ACEs *n* (%)	4631 (45.47)	5659 (54.30)	5978 (56.66)
≥2 ACEs *n* (%)	2271 (22.39)	2478 (23.78)	2318 (21.97)
Child age (years)			
M (SE)	3.13 (0.19)	5.22 (0.24)	7.23 (0.25)

Abbreviation: GP, grandparent.

[a]The total number of different types of financial support provided.

[b]Frequencies ACE *type* calculated with $N = 10,769$ families meeting inclusion criteria.

[c]Based on Sweep 1 because of missing data on marital status at Sweep 2.

model implemented in R package survey as function *svyglm* (Lumley and Scott 2017) cannot account for any clustering within families over time. This would be possible with a (generalized) linear mixed model; however, there is currently no consensus on how to incorporate complex sampling characteristics in such models (cf. West and Galecki 2012). In our analyses we assume independence of observations, which is almost certainly not the case for the repeated measurements nested within a family, which may lead to inflated Type 1 errors. To evaluate the impact of ignoring clustering of observations at the level of the families we conducted additional analyses predicting dependent variables observed during Sweep 3 from predictors observed during Sweep 2 as well as dependent variables from Sweep 4 from Sweep 3 predictors (see Supporting Information). These analyses yield results that are very similar to the model which includes three measurement occasions.

TABLE 3 | Final model for prosocial behaviour (reference category = GP [grandparental care]). The unweighted analytic sample based on complete cases for each Sweep is $N = 25{,}806$.

	Estimate	Std. error	*t* value	Pr(>|t|)	
Intercept (child care with GP)	2.009	0.008	241.210	0.000	***
Family income	0.004	0.002	2.083	0.038	*
Mother age	−0.005	0.003	−2.030	0.043	*
Mother academic qualification	0.008	0.002	3.682	0.000	***
Siblings	−0.011	0.002	−4.362	0.000	***
GP co-residence (yes)	−0.005	0.008	−0.646	0.519	
GP financial help	0.001	0.002	0.701	0.484	
Child gender (girl)	0.061	0.004	16.170	0.000	***
Child ethnicity	0.010	0.007	1.406	0.160	
Child long illness	−0.007	0.002	−3.143	0.002	**
Child age	0.044	0.003	14.850	0.000	***
Child care (without GP)	−0.002	0.010	−0.213	0.831	
Child care (parental care only)	−0.001	0.011	−0.107	0.915	
ACEs	−0.019	0.007	−2.760	0.006	**
Child age X Child care (without GP)	−0.008	0.004	−1.979	0.049	*
Child age X Child care (parental care only)	−0.004	0.004	−1.203	0.230	
Child age X ACEs	−0.006	0.002	−2.533	0.012	*
Child care (without GP) X ACEs	−0.018	0.009	−1.905	0.058	
Child care (parental care only) X ACEs	−0.007	0.009	−0.768	0.443	
Child age X Child care (without GP) X ACEs	0.011	0.004	3.197	0.002	**
Child age X Child care (parental care only) X ACEs	0.006	0.003	2.191	0.029	*

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.
(Dispersion parameter for quasi-Poisson family taken to be 0.349).

In order to examine whether children's socio-emotional behaviour triggers grandparental care, two multinomial regression analyses were conducted in order to predict category membership of variable child care ('parental care only', 'with grandparental care' and 'without grandparental care') at Sweeps 3 and 4 from predictors observed at Sweeps 2 and 3, respectively. The models were fitted using vector generalized linear models implemented in R package VGAM (Yee 2015). The predictors used in both models were ACEs, prosocial behaviour, internalizing behaviour and externalizing behaviour. The reference category for type of care was 'parental care only'.

3 | Results

3.1 | Descriptives

Table 1 presents the socio-demographic characteristics of the sample and Table 2 displays the distribution of cases across different types of child care, as well as the mean age and the mean values of the dependent variables and ACEs for each sweep. In addition, sample sizes for each combination of ACE and child care are presented in Table S1 (see Supporting Information). The type of child care was not stable across the sweeps for all families, meaning that changes in the type of childcare occurred over time. A total number of 2951 children received only parental care at both Sweeps 2 and 3. Across Sweeps 3 and 4, parental care only was stable for 3957 families. Grandparental care was stable across Sweeps 2 and 3 for 1467 families and across Sweeps 3 and 4 for 1077 families. Other types of informal or formal care without grandparents were stable across Sweeps 2 and 3 for 712 families and across Sweeps 3 and 4 for 306 families. The number of children receiving only parental care increases over time, which matches with reports indicating that young children in the United Kingdom more often receive formal or informal care than older children (https://explore-education-statistics.service.gov.uk/find-statistics/childcare-and-early-years-survey-of-parents).

3.2 | Prosocial Behaviour

Table 3 shows the results of the analyses with prosocial behaviour as dependent variable. There were no apparent effects of grandparental financial help or co-residence, contrasting with our first hypothesis. However, there was a significant three-way interaction between child age, grandparental childcare and ACEs (contrast 'without GP' vs. 'with GP' estimate 0.011, SE = 0.004; contrast 'parental care only' vs. 'with GP': estimate 0.006, SE = 0.003). Hence, when predicting prosocial behaviour with age, type of care and ACEs, analyses revealed that the effects

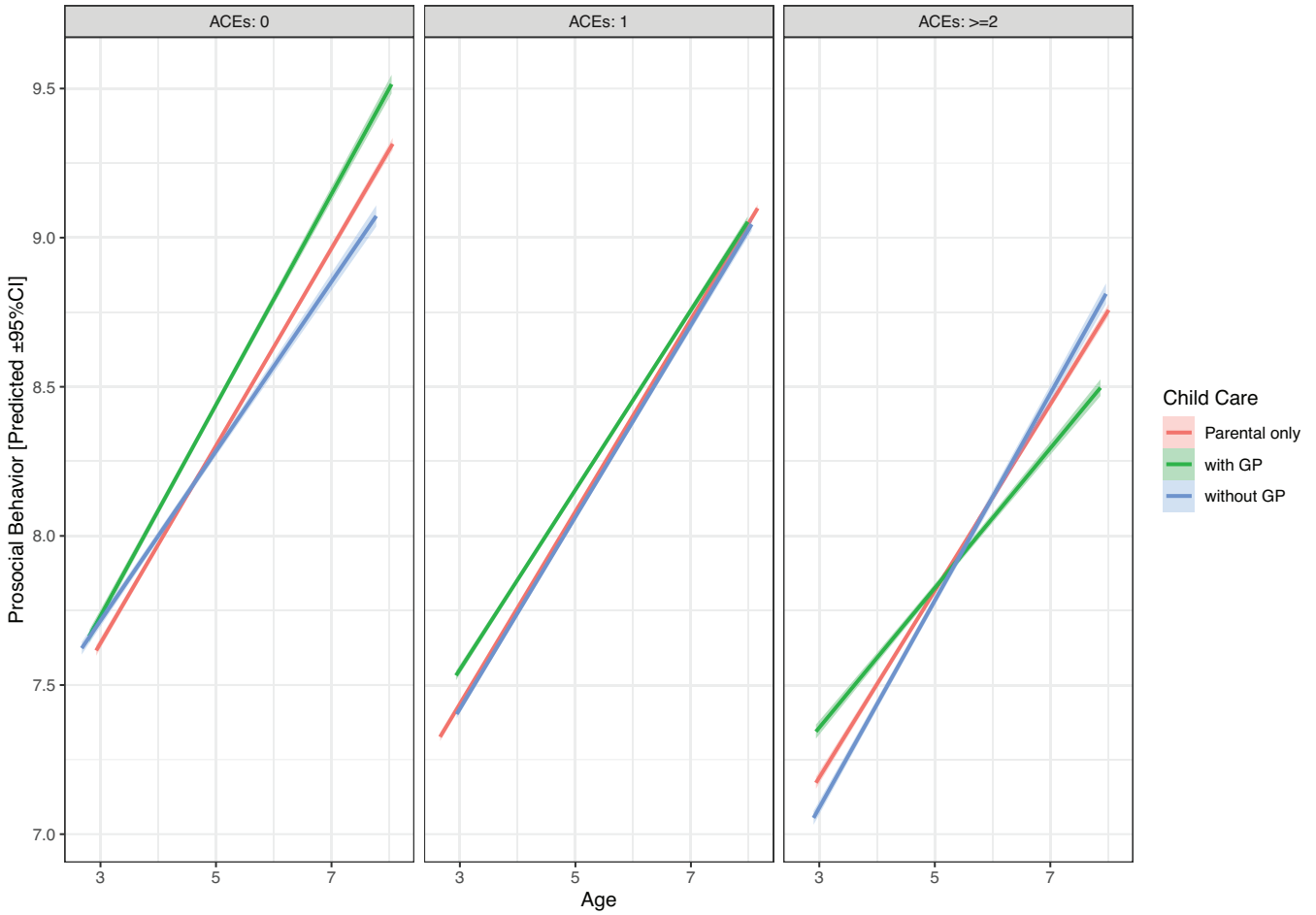

FIGURE 1 | Predicted effects of child care type on prosocial behaviour by child age and number of ACEs. Without GP = formal or informal care without grandparental (GP) involvement, parental care only = parental care only (without formal or informal care), with GP = with grandparental care. Values represent the actual age ranges of the participants. ACE category ≥2 includes participants with 2, 3, 4 and 5 ACEs.

of type of childcare and ACE on prosocial behaviour changed across development. The interaction is visualized in Figure 1. At age 3, children with high levels of ACEs show *more* prosocial behaviour when they receive grandparental care than when they receive only parental care or other forms of informal or formal care. In contrast, by the time they were age 7, children with high levels of ACEs show *less* prosocial behaviour when they receive grandparental care (compared to parental care or other forms of informal or formal care). This indicates that the effect of grandparental care on prosocial behaviour changed over time and reversed between the ages 3 and 7 years. Hence, grandparental care seems to buffer the negative effects of ACEs on prosocial behaviour for young children but may worsen the effects of ACEs when children get older. Our finding is consistent with our second and third hypotheses that grandparental care is particularly beneficial for young children and children with higher levels of adversity, but not consistent with our first hypothesis that grandparental child care is related to increased prosocial behaviour in children with and without ACEs. Effect sizes were small according to conventional Cohen's *d* criteria (see Table S3, e.g., for 3-year-old children without ACE: contrast 'without GP' vs. 'with GP' Cohen's $d = 0.10$, for 3-year-old children with 1 ACE: contrast 'parental care only' vs. 'with GP' Cohen's $d = 0.12$, for 3-year-old children with ≥2 ACEs: contrast 'parental care only' vs. 'with GP' Cohen's $d = 0.05$).

3.3 | Internalizing Behaviour

Table 4 presents the results of the analysis with internalizing behaviour as dependent variable. Analyses revealed a statistically significant interaction between age and ACEs, with more pronounced effects of ACEs with increasing age (see Figure 2) (estimate 0.029, SE = 0.011). In contrast to our first hypothesis, grandparental care, co-residence and financial help were not related to internalizing behaviour. Neither were there interactions between grandparental child care and child age, and/or ACEs, contrasting with the second and third hypothesis (see Table S4 for effect sizes).

3.4 | Externalizing Behaviour

Table 5 presents the results of the analysis with externalizing behaviour as dependent variable. A significant effect of grandparental financial support was found (estimate 0.029, SE = 0.009), indicating that, relative to the reference category (i.e., 3-year-old children with no ACEs and with grandparental child care), financial support was associated with more externalizing behaviour, in contrast to our first hypothesis that grandparental support would be related to lower externalizing behaviour. However, there was no apparent effect of grandparental co-residence, which is,

TABLE 4 | Final model for internalizing behaviour (reference category = GP [grandparental care]). The unweighted analytic sample based on complete cases for each Sweep is $N = 25{,}806$.

	Estimate	Std. error	*t* value	Pr(>|t|)	
Intercept (child care with GP)	0.813	0.036	22.854	0.000	***
Family income	−0.111	0.011	−10.573	0.000	***
Mother age	−0.078	0.011	−6.961	0.000	***
Mother academic qualification	−0.065	0.010	−6.205	0.000	***
Siblings	−0.015	0.011	−1.334	0.183	
GP co-residence (yes)	−0.039	0.038	−1.031	0.303	
GP financial help	0.015	0.009	1.566	0.118	
Child gender (girl)	−0.027	0.019	−1.422	0.156	
Child ethnicity	0.198	0.028	7.005	0.000	***
Child long illness	0.095	0.008	11.551	0.000	***
Child age	−0.023	0.015	−1.557	0.120	
Child care (without GP)	0.010	0.045	0.223	0.824	
Child care (parental care only)	0.026	0.046	0.573	0.567	
ACEs	0.061	0.027	2.220	0.027	*
Child age X Child care (without GP)	0.021	0.021	1.004	0.316	
Child age X Child care (parental care only)	−0.003	0.019	−0.178	0.858	
Child age X ACEs	0.029	0.011	2.603	0.010	**
Child care (without GP) X ACEs	−0.024	0.036	−0.657	0.512	
Child care (parental care only) X ACEs	−0.021	0.033	−0.638	0.524	
Child age X Child care (without GP) X ACEs	−0.007	0.016	−0.433	0.665	
Child age X Child care (parental care only) X ACEs	−0.003	0.014	−0.226	0.822	

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.
(Dispersion parameter for quasi-Poisson family taken to be 2.21).

again, in contrast to our first hypothesis. A statistically significant three-way interaction was found between grandparental care (compared with other forms of formal or informal care), ACEs and child age (estimate = -0.035, SE = 0.010). Hence, when predicting externalizing behaviour with child age, type of care and ACEs, analyses revealed that the effects of type of childcare and ACE on externalizing behaviour changed across development. At age 3, children with high levels of ACEs show *less* externalizing behaviour when they receive grandparental care than when they receive other forms of informal or formal care (see Figure 3) (≥2 ACEs: contrast 'parental care only' vs. 'with GP' Cohen's d = 0.10, contrast 'without GP' vs. 'with GP' Cohen's d = 0.07, see Table S5). These results provide support for hypotheses 2 and 3. In contrast, by the time they were age 7, children with high levels of ACEs show *more* externalizing behaviour when they only receive grandparental care (vs. other forms of informal or formal care) (≥2 ACEs: contrast 'without GP' vs. 'with GP' Cohen's d = 0.15, contrast 'parental care only' vs. 'with GP' Cohen's d = 0.15, see Table S5). These findings indicate that the effect of grandparental care on externalizing symptoms changed over time and reversed between the ages 3 and 7 years.

Because for a large number of families, data on maternal academic qualification was missing (see Figure S1), analyses were repeated without maternal academic qualification, but the results were the same (see Tables S6–S8). In addition, we conducted separate analyses predicting Sweep 3 dependent variables from Sweep 2 predictors and Sweep 4 dependent variables from Sweep 3 predictors. By doing this, we followed the instructions for conducting multivariate analysis for predicting an outcome variable with predictors from a previous sweep suggested by the Millennium Cohort Study (Ketende and Jones 2011, page 19). These results were (as expected) very similar to our repeated measures model (see Tables S9 and S10).

3.5 | Predicting Child Care With Internalizing, Externalizing and Prosocial Behaviour

The findings in the previous section indicate that childcare from grandparents was associated with more prosocial behaviours and less externalizing problems at age 3, but that this had attenuated and, in some cases, reversed by age 7, implying detrimental effects of grandparent care for children experiencing adversity. It is possible that this finding is explained by the selection of certain families into grandparent care. For example, it is plausible that grandparents step in and more often provide care when children show socio-emotional problems, particularly in the face of adversities, such as relationship breakdown. Figure 4 indeed shows type of care is not stable, but changes over time,

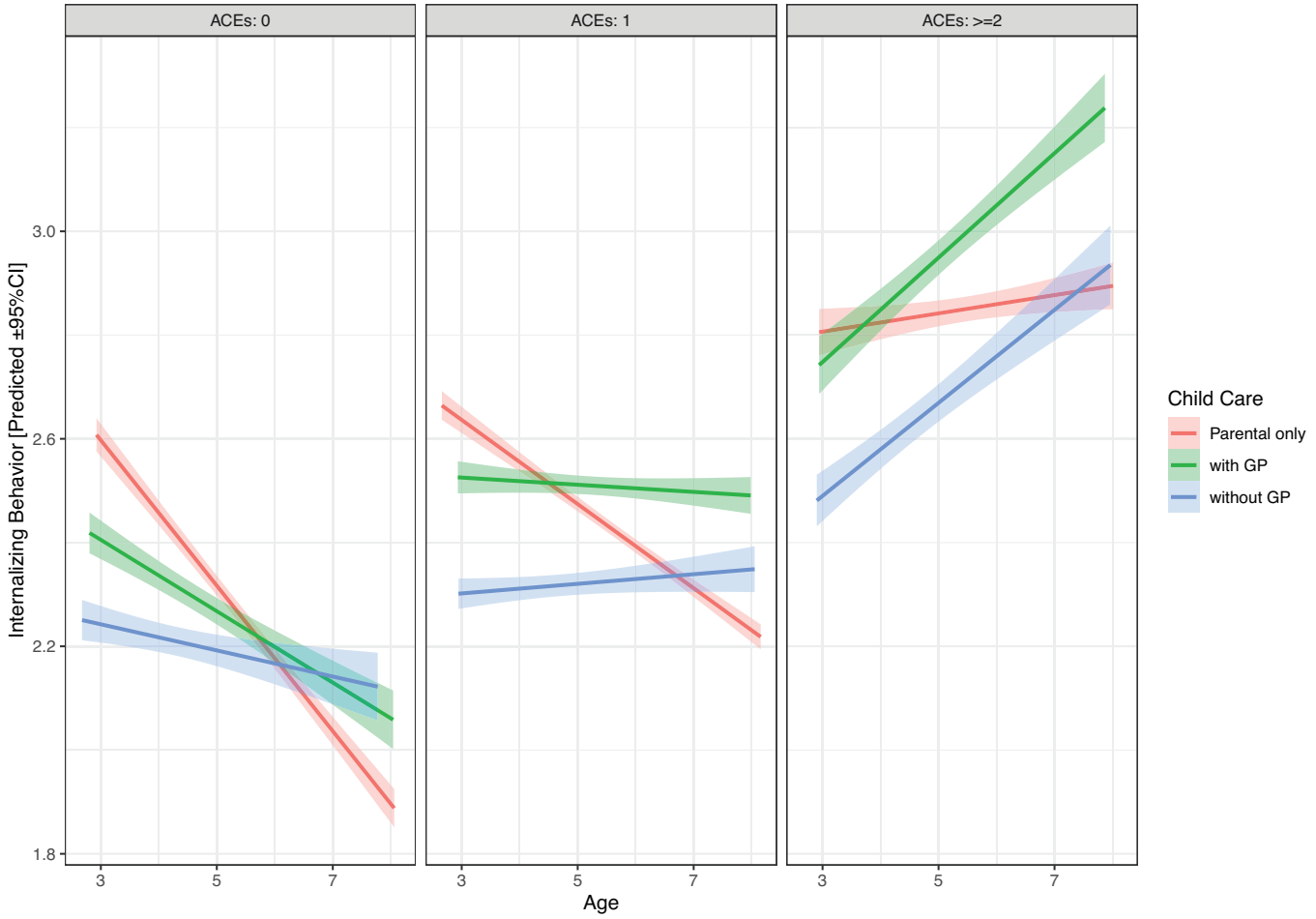

FIGURE 2 | Predicted effects of child care type on internalizing behaviour by child age and number of ACEs. Without GP = formal or informal care without grandparental (GP) involvement, parental care only = parental care only and without formal or informal care, with GP = with grandparental care. Values represent the actual age ranges of the participants. ACE category ≥2 includes participants with 2, 3, 4 and 5 ACEs.

indicating that for some children, grandparents step in and provide grandparental care after a period of formal care or other types of informal care or only parental care. We performed two post-hoc multinomial regression analyses to examine whether type of child care (grandparental, only parental, formal or informal without grandparents) at Sweeps 3 and 4 could be predicted by ACEs and internalizing, externalizing and prosocial behaviour, reported at the previous sweeps. The probability of receiving grandparental care (compared to parental care only) at age 5 was greater among children who behaved more prosocially at age 3 (estimate 0.054, SE = 0.013; see Table 6 and Figure 5). Thus, grandparents are more likely to be involved in the care of 5-year-old grandchildren when children show higher levels of prosocial behaviour earlier in development. The same pattern was seen when repeating these analyses at the subsequent sweep. In contrast, the probability of receiving formal or informal care with or without grandparent at age 5 increased for children with ACEs at age 3 (with grandparent: estimate 0.057, SE = 0.028, (in)formal care without grandparent: estimate 0.108, SE = 0.039). This indicates that the probability of receiving only parental care at age 5 was lower for children who experienced adversity at age 3. Higher levels of internalizing problems at age 5 were related to an increased probability of receiving grandparental care at age 7 (estimate 0.023, SE = 0.011; see Table 7 and Figure 6). Additionally, externalizing problems at age 5 predicted an increased probability of receiving formal or informal care with or without grandparent at age 7 (see Figure 7; with grandparent: estimate 0.044, SE = 0.008, without grandparent estimate 0.024, SE = 0.009). Thus, 5-year-old children who show higher levels of internalizing and externalizing behaviours are more likely to receive grandparental care at age 7 than children with lower levels of these behaviours.

Hence, these additional analyses indicate that children's prior behaviours and the experience of adversity can alter the likelihood of receiving grandparental care, sometimes in opposing ways. Therefore, our main findings may be subject to bias.

4 | Discussion

In this study, we examined whether grandparental support is a protective factor for children's psychological wellbeing in the context of family adversity. No overall association between grandparental care and children's socio-emotional functioning were found, but when allowing these associations to vary by age and ACEs, patterns emerged for prosocial behaviour and externalizing problems. In line with our hypothesis that grandparental care would buffer the effects of ACEs, we found

TABLE 5 | Final model for externalizing behaviour (reference category = GP [grandparental care]). The unweighted analytic sample based on complete cases for each Sweep is $N = 25{,}806$.

	Estimate	Std. error	*t* value	Pr(>|t|)	
Intercept (child care with GP)	1.360	0.028	49.349	0.000	***
Family income	−0.071	0.010	−6.994	0.000	***
Mother age	−0.095	0.010	−9.227	0.000	***
Mother academic qualification	−0.084	0.010	−8.844	0.000	***
Siblings	−0.025	0.010	−2.533	0.012	*
GP co-residence (yes)	0.006	0.033	0.190	0.849	
GP financial help	0.029	0.009	3.268	0.001	**
Child gender (girl)	−0.245	0.017	−14.074	0.000	***
Child ethnicity	−0.008	0.030	−0.270	0.787	
Child long illness	0.052	0.007	7.694	0.000	***
Child age	0.006	0.010	0.589	0.556	
Child care (without GP)	0.033	0.035	0.948	0.344	
Child care (parental care only)	0.120	0.034	3.551	0.000	***
ACEs	0.128	0.018	7.302	0.000	***
Child age X Child care (without GP)	0.029	0.016	1.865	0.063	
Child age X Child care (parental care only)	−0.033	0.012	−2.678	0.008	**
Child age X ACEs	0.027	0.006	4.544	0.000	***
Child care (without GP) X ACEs	0.050	0.022	2.212	0.028	*
Child care (parental care only) X ACEs	−0.038	0.023	−1.641	0.102	
Child age X Child care (without GP) X ACEs	−0.035	0.010	−3.524	0.000	***
Child age X Child care (parental care only) X ACEs	0.004	0.008	0.517	0.606	

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.
(Dispersion parameter for quasi-Poisson family taken to be 2.282).

that children with high levels of ACEs showed *more* prosocial behaviour when they received grandparental (as opposed to other sorts of) care. However, this protective effect was only observed at age 3. By age 7, children with high levels of ACEs receiving grandparental care showed *less* prosocial behaviour. A similar pattern was observed for externalizing problems: Grandparental care was related to *less* externalizing behaviour for young children, but this effect changed across development. At age 7, children with high ACEs showed high levels of externalizing symptoms when they received grandparental care than when they received non-grandparental informal or formal care, possibly because children's socio-emotional problems trigger more grandparental care. Indeed, post-hoc analyses showed that internalizing and externalizing behaviours at age 5 were related to an increased probability of grandparental childcare at age 7. No grandparent effects on internalizing problems were found. Together, our findings point to a protective effect of grandparental care on children's socio-emotional outcomes only at age 3. Our findings add to previous research on the effects of grandparental support using cross-sectional data and underscore the importance of applying a developmental perspective in the study of grandparenting.

The finding that grandparental care is related to better socio-emotional outcomes in the very early years is consistent with evolutionary theories that point to a pivotal role of grandparents, in particular grandmothers, for *young* children. More specifically, according to the Grandmother Hypothesis, an evolutionary theory that has been proposed to explain the prolonged post-reproductive phase in woman's life, grandmothers' assistance in feeding a grandchild in the post-weaning phase in early childhood helps their daughters produce more children at shorter intervals, resulting in more transmission of longevity genes to next generations (Hawkes 2004; Hawkes et al. 1998). For young children, grandparents may function as a source of love and affection, or as an attachment figure that can provide comfort in times of distress (Van Ranst et al. 1995). A secure attachment relationship with a non-parental caregiver, such as a grandparent, may interact with mother–child attachment patterns, or father–infant attachment, in predicting children's developmental outcomes (van Ijzendoorn, Sagi, and Lambermon 1992), with more favourable outcomes for children who benefit from sensitive grandparental care. Indeed, recent research showed that analysing early attachment as a network of attachments can be predictive of socio-emotional outcomes (Dagan et al. 2022) and that quality of grandmother-mother coparenting is associated with infant-mother attachment and levels of child externalizing problems (Liang et al. 2021). However, grandparental contributions to care of young children could also indirectly promote children's socio-emotional development by impacting

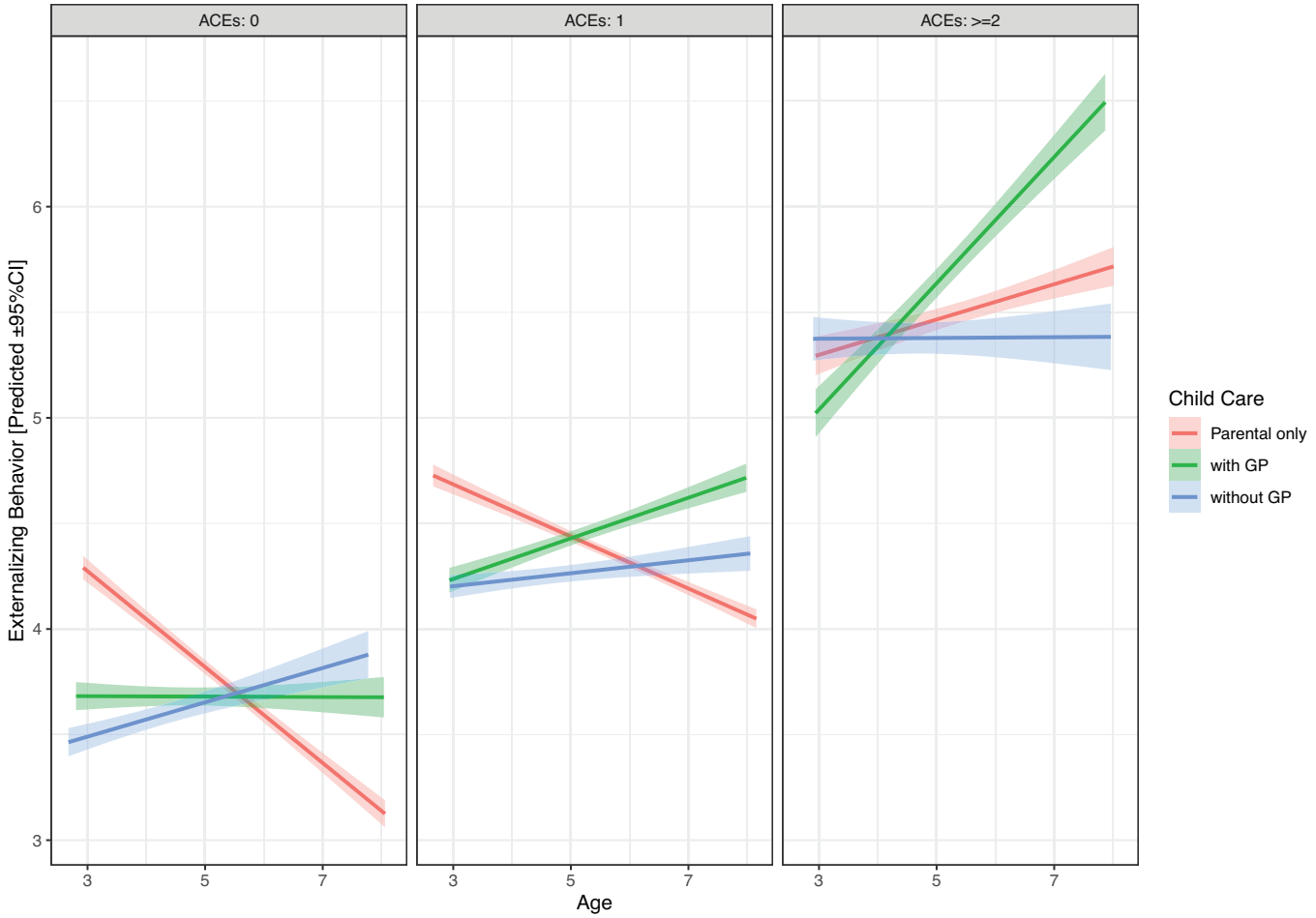

FIGURE 3 | Predicted effects of child care type on externalizing behaviour by child age and number of ACEs. Without GP = formal or informal care without grandparental (GP) involvement, only parental care = parental care only (without formal or informal care), with GP = with grandparental care. Values represent the actual age ranges of the participants. ACE category ≥2 includes participants with 2, 3, 4 and 5 ACEs.

TABLE 6 | Multinomial regression ($N = 10{,}074$) predicting category membership of child care ('parental care only', 'with GP', 'without GP') at Sweep 3 from predictors at Sweep 2.

	Estimate	Std. error	*z* value	Pr(>|z|)	
Intercept (with GP)	−1.047	0.116	−9.021	0.000	***
Intercept (without GP)	−1.481	0.158	−9.382	0.000	***
ACEs (with GP)	0.057	0.028	2.044	0.041	*
ACEs (without GP)	0.108	0.039	2.809	0.005	**
Prosocial (with GP)	0.054	0.013	4.244	0.000	***
Prosocial (without GP)	−0.005	0.017	−0.309	0.757	
Internalizing (with GP)	−0.011	0.010	−1.149	0.250	
Internalizing (without GP)	−0.024	0.014	−1.738	0.082	
Externalizing (with GP)	−0.009	0.007	−1.330	0.184	
Externalizing (without GP)	−0.013	0.009	−1.378	0.168	

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.
No Hauck–Donner effect found in any of the estimates.

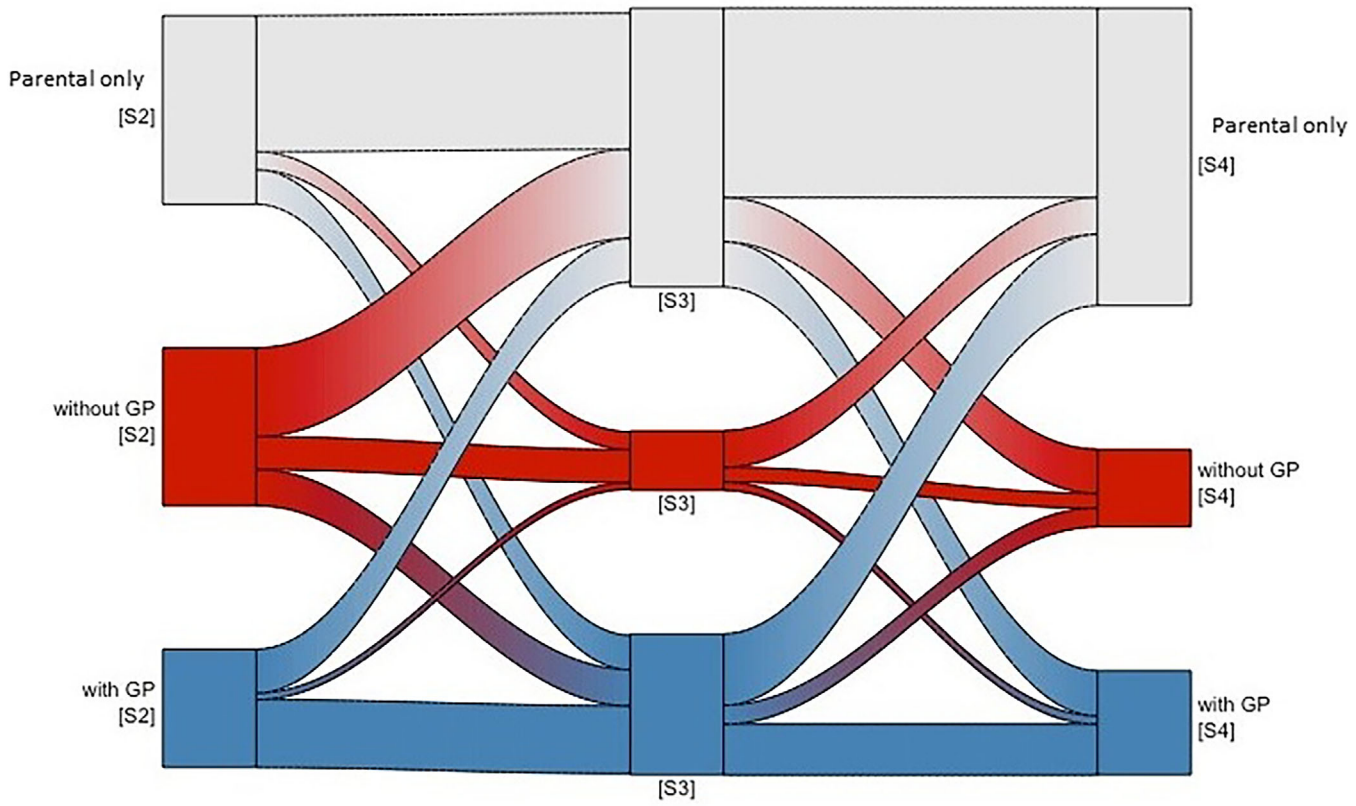

FIGURE 4 | Changes in type of care across the different sweeps (S2, S3 and S4). The number of children receiving only parental care is represented with grey, the number of children receiving formal or informal care without grandparental involvement is represented in red, and the number of children receiving grandparental care is represented in blue. GP, grandparent.

TABLE 7 | Multinomial regression ($N = 10{,}074$) predicting category membership of child care ('parental care only', 'with GP', 'without GP') at Sweep 4 from predictors at Sweep 3.

	Estimate	Std. error	*z* value	Pr(>|z|)	
Intercept (with GP)	−1.605	0.162	−9.939	0.000	***
Intercept (without GP)	−1.558	0.179	−8.705	0.000	***
ACEs (with GP)	−0.002	0.034	−0.070	0.944	
ACEs (without GP)	0.032	0.037	0.862	0.389	
Prosocial (with GP)	0.036	0.016	2.203	0.028	*
Prosocial (without GP)	0.007	0.018	0.400	0.689	
Internalizing (with GP)	0.023	0.011	2.180	0.029	*
Internalizing (without GP)	0.005	0.012	0.435	0.663	
Externalizing (with GP)	0.044	0.008	5.733	0.000	***
Externalizing (without GP)	0.024	0.009	2.747	0.006	**

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.
No Hauck–Donner effect found in any of the estimates.

on parental well-being and caregiving abilities. A recent meta-analysis showed that grandparental support is related to better maternal mental health in the first year postpartum (Riem et al. 2023), which is an important prerequisite for providing high-quality care. Other recent studies indicate that sharing the burden of care with grandparents during the period of school closures during the COVID-19 lockdown positively impacted maternal mental health and lowered risk for harsh parenting, in particular for mothers with young children (Riem et al. 2021; Guo et al. 2022).

Interestingly, our findings show that the protective effect of grandparental care for children changed over the course of development. In fact, at age 7, grandparental care was related

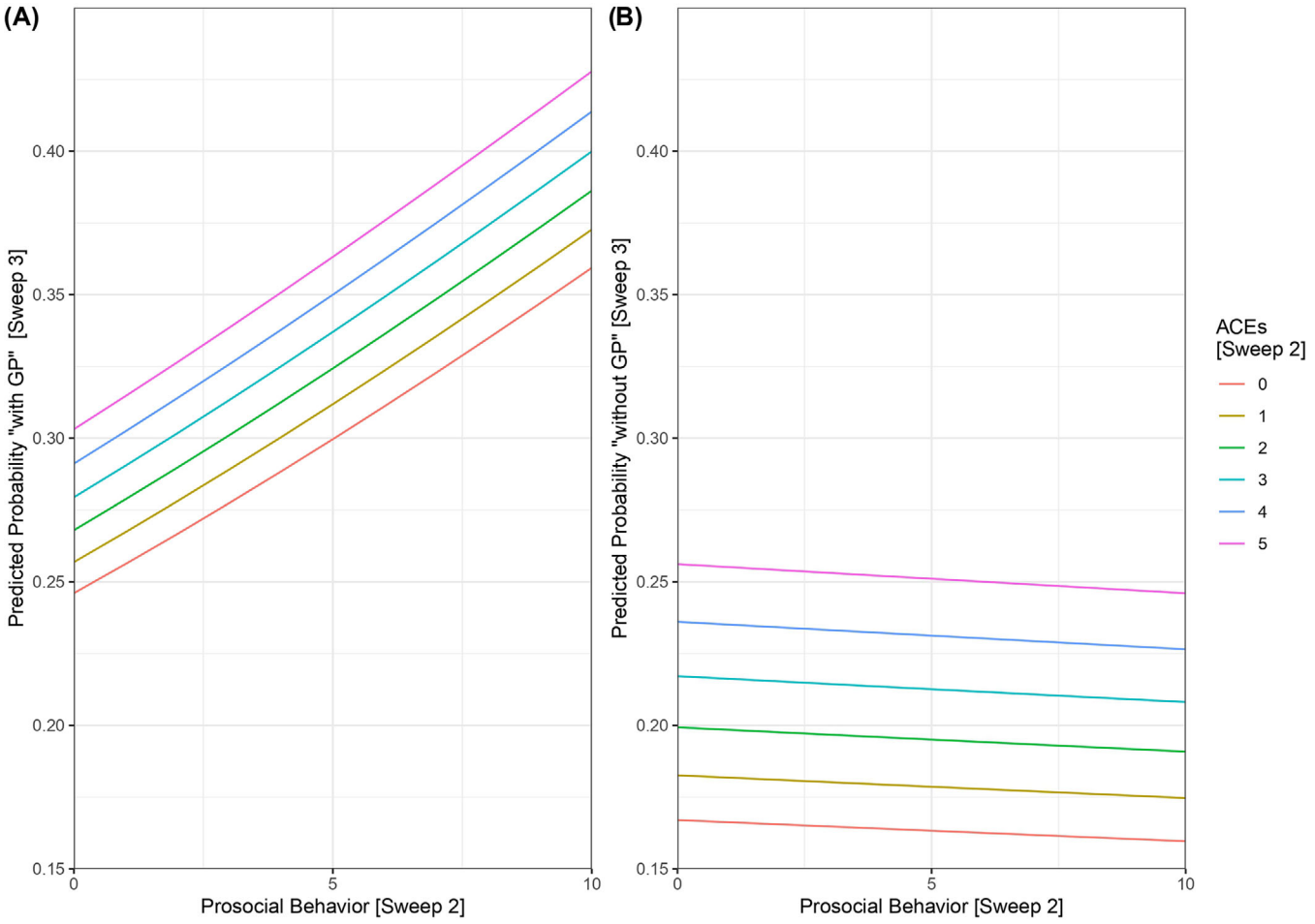

FIGURE 5 | Predicted probability of child care category 'with GP' (Panel A) and 'without GP' (Panel B) at Sweep 3, based on prosocial behaviour and ACEs observed at Sweep 2. The other predictors in the model (internalizing and externalizing behaviour) were fixed at their mean observed value at Sweep 2 ($M_{SDQI} = 2.79$, $M_{SDQE} = 4.63$).

to *worse* prosocial outcomes and *more* externalizing symptoms for children who grow up in the presence of adversity. One explanation for these unexpected findings, is that socio-emotional problems of children in adverse conditions trigger more support and involvement of grandparents, in particular when children get older and when problems become more apparent. Our finding that internalizing and externalizing behaviour at age 5 predicted grandparental care at age 7—with more socio-emotional problems related to an increased probability of later grandparental childcare involvement—is consistent with this explanation. This finding may explain the association between grandparental care and higher levels of externalizing symptoms at age 7 and suggests that grandparents step in to provide care when children experience socio-emotional problems or show adjustment problems in the context of adversity. Previous studies also show that grandparents are the first to take on child caregiving responsibilities in response to family problems (Fuller-Thomson and Minkler 2001; Gorman and Braverman 2008; Hayslip, Blumenthal, and Garner 2014; Smith et al. 2018). An alternative explanation for the association between grandparental care and *worse* prosocial outcomes and *more* externalizing symptoms at age 7, is that grandparental childcare interferes with parent–child interactions and/or indirect advice or conflicts with parents add to family stress, which in turn negatively impacts on children's socio-emotional functioning (or at least the parents' perception of it). Previous studies indeed suggest that presence of grandparents can have negative effects on children's well-being, in particular when resources are low (Sheppard and Sear 2016). Involvement of grandparents in family life may, for example, change the amount of income available in the household, entailing changes in child nutrition or education (e.g., due to income diverted to grandparents that require assistance) (Sadruddin et al. 2019). This explanation is, however, less likely because we also found that maternal grandparental financial support is related to *more* externalizing symptoms in 3-year-old children receiving grandparental care with no ACEs.

From an evolutionary perspective, it makes sense that grandparents have a larger influence on their children and grandchildren during times of need. According to evolutionary theories, parents optimally allocate resources to kin in order to maximize their reproductive fitness (Smith and Fretwell 1974). Similar to parents, grandparents may invest more in grandchildren with higher needs in order to maximize their descendants' benefits. Indeed, studies show that grandparents are inclined to be more involved in the caregiving of grandchildren when conditions are harsh, such as single-parenthood, child illness or teenage mothers (Coall et al. 2018; Dunifon and Kowaleski-Jones 2007; Mitchell

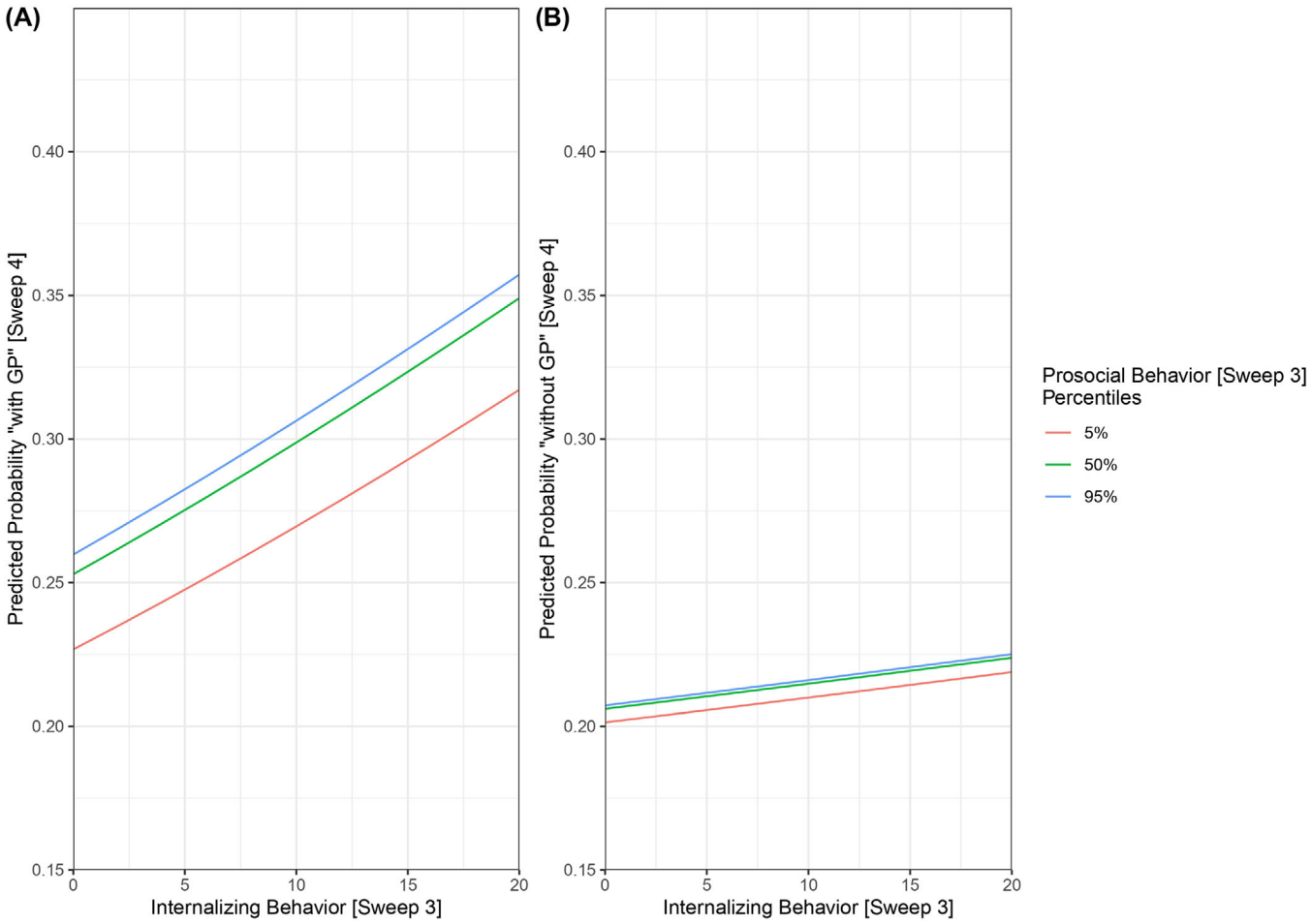

FIGURE 6 | Predicted probability of child care category 'with GP' (Panel A) and 'without GP' (Panel B) relative to category 'parental care only' at Sweep 4 by internalizing behaviour observed at Sweep 3. Lines represent the 5th, 50th and 95th percentile of prosocial behaviour observed at Sweep 3 (5, 9 and 10, respectively). The other predictors in the model (ACEs and externalizing behaviour) were fixed at their mean observed values at Sweep 3 ($M_{ACEs} = 1.06$, $M_{SDQE} = 4.63$).

2007). The current study extends these findings by showing that maternal grandparents seem to respond in terms of their financial support when grandchildren signal socio-emotional problems and in terms of their involvement in care when grandchildren show adjustment problems during conditions of harshness. Our finding that grandparental childcare *follows* poor child outcomes also give more insight into negative or mixed effects of grandparental care on child development shown in our main analysis and reported by previous cross-sectional studies (Sadruddin et al. 2019). Grandparental care seems bidirectionally related to children's socio-emotional behaviour and effects are dependent on child age and ACEs.

An unexpected finding was that prosocial behaviour predicted type of childcare at the subsequent sweep. More specifically, children's prosocial behaviour at ages 3 and 5 was related to a higher probability of grandparental care 2years later, but not to other forms of non-grandparental (in)formal care. One explanation is that grandparents find it more pleasurable to be with prosocial grandchildren and are therefore more willing to be involved in childcare, although the same argument could be made for children who experience internalizing and externalizing behaviours which our data do not support. Interestingly, ACEs at age 3 also predicted the type of childcare at age 5, with an increased likelihood of (in)formal care with or without grandparents. Thus, parents more often share childcare with formal or informal childcare providers after exposure to ACEs, which possibly reflects an increased parental need for support with childcare, for example, after the breakdown of a relationship.

Some limitations should be noted. First, it should be noted that we used a cumulative ACE score, which is a common, but not optimal approach for measuring adversity, as it fails to consider which adversities tend to co-occur and how they are differentially related to outcomes (Lacey and Minnis 2020). A more statistically complex methodology such as a factor analytic approach to measuring maltreatment may be preferred to address this limitation (Brumley, Brumley, and Jaffee 2019). Moreover, it should be noted that self-report measures of domestic violence, and physical and emotional abuse may be affected by bias. It should, however, be noted that in this study only mild forms of abuse were examined as only two items of Conflict Tactics Scale were administered. Similar to a previous study administering the Conflict Tactics Scale in a Dutch population-based cohort study (Jansen et al. 2012), a large number of parents reported having shouted at their

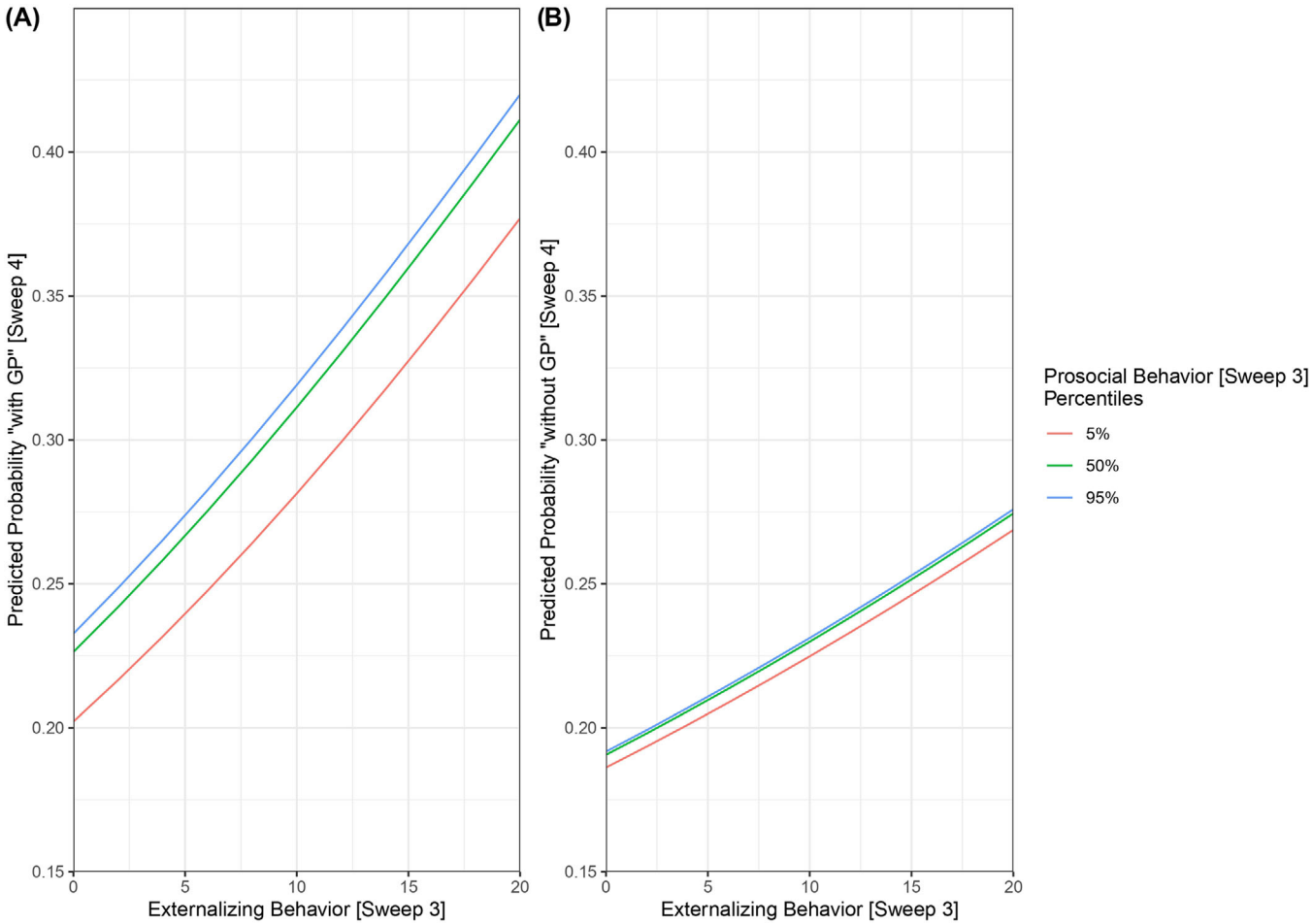

FIGURE 7 | Predicted probability of child care category 'with GP' (Panel A) and 'without GP' (Panel B) at Sweep 4 relative to category 'parental care only' by externalizing behaviour observed at Sweep 3. The lines represent the 5th, 50th and 95th percentile of prosocial behaviour at Sweep 3 (5, 9 and 10, respectively). The other predictor in the model (ACEs and internalizing behaviour) were fixed at their mean observed value at Sweep 3 ($M_{ACEs} = 1.06$, $M_{SDQI} = 2.41$).

child. Although bias may be possible, misclassification in parents who did report harsh parenting is less likely.

It should also be noted that the effect sizes that we found in the current study were small according to conventional criteria, consistent with previous studies reporting small effect sizes when examining effects of grandparental care in middle childhood or adolescence (Fergusson, Maughan, and Golding 2008; Profe and Wild 2017, Van Heerden and Wild 2018). A recent meta-analysis also found a small effect size of grandparental support on maternal mental health (Riem et al. 2023). Although the reported effect sizes in the current study are small, it is important to keep in mind that effects of grandparental care that are seemingly small can have large impact when rolled out in large populations. For example, in policies promoting grandparental care, such as through leave or flexible work.

Another limitation that should be noted is that causality cannot be concluded, although our findings hint towards bidirectional associations between grandparental care and children's socio-emotional development. We did not explicitly adjust for reverse causation (although we did consider this, indirectly, in a post-hoc analysis) and our results are likely to be subject to unmeasured and residual confounding. Furthermore, in light with the previously reported beneficial effects of the maternal grandmother (Riem et al. 2023), it was not possible to test potential differential effects of grandmaternal or grandpaternal support or differences in the role of maternal versus paternal grandparents, or to examine the characteristics of grandparents such as age or health. Previous research has shown that support from the maternal grandmother is most beneficial for family life. A recent meta-analysis showed that support from mother's own mother was most strongly related to maternal mental health in the first year postpartum (Riem et al. 2023). However, benefits of grandfathering are less clear (Coall et al. 2018) and more research is crucially needed to understand grandpaternal caregiving roles. Future studies should therefore test the role of different types of grandparental kinships. Additionally, in the current study we only assessed the role of quantity of grandparental support and information on quality of involvement was lacking. Effects of grandparental support are likely dependent on the quality of the intergenerational relationship. When there are conflicts in the relationship with parents, or when the quality of the interaction between grandparent and child is low because of grandparental insensitive care, grandparental presence may not contribute to

optimal child development. Future research should therefore devote attention to the role of the quality of the grandparental interaction. Lastly, it should be noted that grandparental support was parent-reported, possibly resulting in bias, and there was no information on grandparental age and health, potential confounders may have influenced the amount of childcare provided. Additionally, results may be subject to bias because of missing data. For example, not all families participating in the MCS were included in the present study because of missing information on type of childcare (see Figure S1).

High-quality care is particularly important because grandparents seem to increase their involvement when children experience socio-emotional problems, which can be challenging for all caregivers, including grandparents. Although grandparents play an increasingly important role in childcare, there is a lack of research on interventions for enhancing grandparenting skills. Hence, the core elements needed for an effective grandparenting intervention are yet unknown (Sherr et al. 2018), which is in sharp contrast with the sound evidence base on parenting interventions. Future research should address this gap in knowledge on grandparenting, for example, with the development of interventions aimed at enhancing the quality of coparenting with mother or father, or stimulating grandparental sensitivity. Given grandparents' role in childcare and thus in children's development, the study of grandparenting needs more attention.

In sum, we examined whether grandparental support is a protective factor for children's psychological wellbeing in the context of family adversity. Using longitudinal data from the Millennium Cohort Study, we examined changes in the effects of grandparental support across development. Our finding that grandparental care is related to more prosocial behaviour and less externalizing problems at age 3 points to an early protective effect of grandparental care for children who grow up in adversity. Moreover, our results suggest that grandparents respond to children's socio-emotional problems and family adversity by increasing their involvement in care. Hence, grandparents seem to offer more than just treats. Together, these findings underscore the important role of grandparents and indicate that the current exclusive focus on parental caregiving roles in child and family studies is insufficient. Instead, our research highlights the importance of going beyond the nuclear family towards the impact of the wider family network when examining children's socio-emotional development.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in the UK Data Service at https://doi.org/10.5255/UKDA-Series-2000031.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.