Children of the 2020s: first survey of families at age 9 months

Research report

November 2023

Dr. Marialivia Bernardi*[1], Dr. Laurel Fish*[1], Jessica van de Grint-Stoop[2], Sarah Knibbs[3], Prof. Alissa Goodman[1], Prof. Lisa Calderwood[1], Dr. Sandra Mathers[4], Kavita Deepchand[3], Chris Ferguson[3], Tania Borges[3], Prof. George Ploubidis[1], Prof. Jacqueline Barnes[5], Prof. Julie Dockrell[1], Dr. Claire Crawford[6], Prof. Lindsay MacMillan[1], Kevin Pickering[3], Prof. Pasco Fearon[2].

* These authors contributed equally to this work and are joint first authors of this report.
[1] University College London, [2] University of Cambridge, [3] Ipsos, [4] University of Oxford, [5] Birkbeck, University of London, [6] University of Birmingham.

Contents

List of figures

List of tables

Acknowledgements

Glossary of terms

Use of language: Throughout the report we have used 'caregiver' or 'parent/carer' to reflect the variation of adult-child connections within families participating in the study. We have reflected the social model of disability by referring to 'people with a disability'.

Attainment: Refers to the measure of a child's achievement in school which compares every child to a standardised expectation for their age level, regardless of individual starting points.

BabySteps app: The BabySteps app has been specifically designed for the purpose of the Children of the 2020s (COT20s) study. It is a free smartphone app that was designed by academics to help parents capture their child's learning and development, keep precious memories of them growing up and help scientists study child development at the same time. It is also an additional measurement tool for collection of data between the main study surveys.

Birth cohort: A cohort is a selected group of people with a shared characteristic, which in the case of a birth cohort is when they were born.

Census of England: The census is a survey undertaken by the Office for National Statistics (ONS) every 10 years and gives a picture of all the people and households in England and Wales.

Children of the 2020s (COT20s): Children of the 2020s is a national research study following the lives of children born in the 2020s over the course of their first five years, commissioned by the Department for Education (DfE) and led by University College London (UCL).

COVID-19 pandemic: Refers to the global pandemic outbreak of coronavirus, an infectious respiratory disease, which started in late 2019.

Developmental milestones: These are behavioral or physical checkpoints in children's development as they grow up, which can be divided into different aspects of development. Examples are: motor milestones, sensory milestones, communication milestones and feeding milestones.

Digital technology: Digital technologies are electronic tools, devices, systems, and resources which generate, store or process data such as social media and mobile phones.

Disparity: Disparity refers to a difference between two groups, a difference that is often considered unfair. Disparities can be present in multiple areas, including: socio-economic and demographic.

Early childhood education and care (ECEC): This consists of any arrangement that provides education and care for children from birth to compulsory primary school age.

Formal ECEC in this report includes the following categories: Individual - Childminder, Professional nanny; Group-based – Day nursery, Nursery school, Pre-school or playgroup, Special day school or nursery or unit for children with special educational needs. With the exception of professional nannies, these settings are regulated by government and Ofsted, provide funded childcare from age 2, and deliver the early years curriculum.

Informal ECEC in this report includes care provided on a regular basis by a relative, friend or neighbour in a domestic setting on an individual basis. It includes arrangements with an au pair but does not include care provided by the child's other parent (regardless of whether cohabiting with the child's primary caregiver).

Economic activity: Refers to a measure of whether a person is an active participant in the labour market. People aged 16 years and older are considered economically active if they are: in employment, unemployed, but looking for work and could start within two weeks or unemployed, but waiting to start a job.

Education and Outcomes Panel Studies (EOPS): This is a programme of observational studies that comprises 4 staggered longitudinal panel studies which each include 5 waves of survey data collection and administrative data linkage that covers all the phases of life that are critical to the DfE policy from Early Years through to post-16 routes and early adult life. Children of the 2020s is the first of these studies, beginning at approximately 9 months of age.

Equivalised: Application of an equivalence scale to adjust a total of some value to facilitate comparison. In this report this was applied to income and education. For income the total income from all sources was divided by variations in the size and composition of the family, including the primary caregiver, their cohabiting partner and their dependent children using the modified OECD equivalence scale. For education qualification level qualifications were equivalised across academic and vocational qualification to compare the highest level of qualification across academic and vocational qualifications. This resulted in a 6-point scale of qualification level ranging from 'No qualification' to 'level 5' equivalised qualification.

Family composition: Family composition describes different family structures. In this study we distinguish between single parent/carer families and coupled parent/carer families. Single parent/carer families are families where a child/children regularly live with only one of their parents or caregivers at a time. Couple parent/carer families are families where a child/children regularly live with two parents or caregivers at a time.

Family Hubs: Physical and virtual places where services to support families come together, organised through local community providers, from birth registration to

midwifery, health visiting to mental health support and parenting courses to infant feeding advice.

Home learning environment: Activities and interactions that offer learning opportunities to the child in the home.

Inequalities: Disadvantages in outcomes between groups with certain characteristics, often reflecting different socio-economic factors such as family income, primary caregiver education, primary caregiver ethnicity and family type.

Longitudinal research: Refers to research in which data are collected from the same individuals multiple times over a period of time to study change.

Nationally representative: This means that the data from a sample of the population statistically represent the entire population of the country in terms of relevant background demographics (for example, age, ethnicity and income).

National Statistics Socio-Economic classification (NS-SEC): The NS-SEC has been constructed to measure the employment relations and conditions of occupations. These are central to showing the structure of socio-economic positions in modern societies and helping to explain variations in social behaviour and other social phenomena.

National Vocational Qualification (NVQ): The NVQ is a work-based qualification that recognizes skills and knowledge for certain jobs. Possible levels vary between 1 and 8.

Norm-reference: Norm-reference is a type of evaluation that creates a score by comparing one's results to the results of others in the peer group.

Means-tested benefits: Means-tested benefits are benefits for which one's eligibility depends on their personal or household income and capital.

Millennium Cohort Study (MCS): MCS is a longitudinal study following the lives of around 19,000 young people born across England, Scotland, Wales and Northern Ireland in 2000-02.

Multivariate analysis: Refers to analyses that involve evaluating multiple variables (more than two) to identify any possible association among them, for example multiple regression.

Primary caregiver: This person was defined as the parental figure who spent the most time caring for the child.

Record linkage: Record linkage happens when multiple records (from different sources) with the same identity are connected to each other. For this study, when participants agreed, the educational and health records of both the caregiver and child are accessible to supplement data from this study education record (of both caregiver and child);

Responsiveness: This is the extent to which caregivers can adequately respond to children's needs and demands.

Rising cost of living pressures: The increase in the amount of money required to cover necessary expenses to maintain a certain lifestyle standard in a particular place and time.

Risk factors: Something that makes a certain negative health, educational or developmental outcome more likely to happen.

Sample weights: These are certain values that are added to a dataset to ensure that metrics derived from a data set are representative of the population.

Services: In this report services refer to the professionals and organisations that provide support with infant health and development.

Start for Life services: This refers to the services – including local government run, NHS, community and voluntary services – which offer support to babies and their families during the period from conception to the age of 2.

Statistically significant: A research finding is statistically significant if the results in the data are unlikely to have occurred by chance alone. More precisely, in social science, if the p-value (probability value) is less than 5% it is, by convention, generally accepted that the results are unlikely to be explained by chance.

Stressors: A situation or event that causes one to feel stressed. This includes both normative stress (which may be necessary for development) as well as more intense stress than may be harmful.

Study of Early Education and Development (SEED): The Study of Early Education and Development (SEED) is a major longitudinal study following nearly 6,000 children from across England from age two. It started in 2013, and it is funded by the Department for Education (DfE).

Sure Start Children's Centres: Sure Start Children's Centres were designed to offer a place in every community where families of young children aged 0 to 5 can go to access care and support.

Universal: Universal services are those which are accessible to all, including health visiting and midwifery services.

Executive summary

Key findings of Children of the 2020s (COT20s) wave 1

COVID-19

- COT20s is the first national birth cohort study in England sce the COVID-19 pandemic. Children included in this study were born between September and November 2021, therefore their gestation period coincided with the roll out of vaccinations and the lifting of social distancing measures.
- Fourteen percent of mothers had had a confirmed or suspected COVID-19 infection during their pregnancy with the cohort child. Between birth and age 9.5 months, almost half of the cohort children (41%) and more than half of their parents/carers (57%) had been infected with COVID-19.

Physical and mental health

- Parents and children were generally in good health but some disparities were evident.
- 23% of primary caregivers reported a longstanding physical or mental health condition or illness. For 13% of primary caregivers, a longstanding health condition reduced their ability to carry out day-to-day activities.
- Most children (74%) did not have any serious or longstanding health or developmental condition by age 9.5 months, though 20% had one condition and 5% had two conditions.
- Being a single parent/carer and having a lower family income were both independently associated with scoring above the threshold for risk of anxiety and depression and poorer general health among parents/carers, and preterm birth and poorer physical health in their children. For example, 19% of primary caregivers in the lowest family income quintile scored above the threshold for depression, compared to 3% of primary caregivers in the highest family income quintile; and 27% primary caregivers in the lowest family income quintile reported their health to be 'fair', 'bad' or 'very bad', compared to 10% of primary caregivers in the highest family income quintile.

Financial strain

- One in four families (25%) had experienced significant financial strain, such as having difficulties managing finances, not keeping up with bills, being unable to afford essential baby items, and having to skip or cut the size of meals.

Early language development and the home learning environment

- Children's language comprehension development, as measured by the number of words understood at age 9.5 months, was not significantly different from pre-pandemic norms.

- Parents frequently engaged their babies in a variety of stimulating activities and experiences which were associated with language comprehension development. Children who experienced a lower frequency and variety of home learning activities at age 9.5 months on average understood fewer words.
- At age 9.5 months the cohort children typically watched 29 minutes of digital content a day on average. There was substantial variation, as 28% did not typically watch any television, videos or other digital content on a screen, while 7% did so for more than 2 hours a day. Children who watched screens (72% of the sample) typically did so for an average of 41 minutes a day.
- There was no relationship between time spent watching digital content on a screen and the number of words understood at age 9.5 months.
- Socio-economic disparities in home activities and interactions were apparent in the first year of life, as indicated by slightly lower mean home learning environment scores for the lowest income families, primary caregivers with the lowest levels of education, and primary caregivers of Black or Black British ethnicity, and of Asian or Asian British ethnicity.

Early childhood education and care (ECEC)
- By age 9.5 months, 43% of families had used some form of early childhood education and care (ECEC) provision (either informal or formal) on a regular basis, while 57% had not used any regular ECEC provision.
- One in eight families (13%) had regularly used formal ECEC, most often day nurseries (6%), nursery schools (3%) or childminders (3%).
- Over a third of families (37%) had regularly used informal care, mainly from grandparents (34%), other relatives or friends.
- Families in the highest income quintile were the highest users of both informal and formal childcare (40% regularly used informal childcare and 23% regularly used formal). In contrast, single parent families were high users of informal childcare (40%) but low users of formal childcare (9%).

Service use
- Almost all primary caregivers saw a health visitor (97%) and the majority saw a midwife (88%) or a General Practitioner (GP; 87%) in the 9.5 months after birth. Fewer than 1% of families had seen no professional since their baby was born. 24% of primary caregivers reported experiencing difficulties accessing a GP and 19% reported difficulties accessing a health visitor.
- The most frequently used child and family support services were baby classes (used by 38% of primary caregivers), playgroups or play sessions (37%), and breastfeeding support (26%). However, 36% of primary caregivers had not used any of the 15 activities or support services listed in the survey.
- Fifteen percent of COT20s participants reported that they had used a service offered by a family hub or children's centre since their baby was born, most frequently: playgroups or play sessions, health visitors, baby classes, breastfeeding support, and support/check-ups for infant weight and growth.

Children of the 2020s (COT20s) is the first birth cohort study in England in two decades. It aims to longitudinally measure and track the circumstances and outcomes of babies, and their families, over the first 5 years of life, to provide a rich source of data for researchers and policy makers relating to early learning and development, early childhood education and care (ECEC), and family services. COT20s is the first study in the Department for Education's (DfE) longitudinal research programme collectively referred to as the Education and Outcomes Panel Studies (EOPS). These studies will generate evidence on the progress of children through early years, primary and secondary school, and the post-16 period, with data collection continuing until the end of the decade.

The first survey of the COT20s study took place in the second half of 2022 when the children were on average 9.5 months old. At this time, England was adjusting to post-pandemic life and facing significant cost of living pressures. This report provides a baseline description of the cohort and begins to identify demographic disparities in early life such as in health, childcare, the home environment and service use that might lead to longer-term disadvantages in children's learning and wellbeing.

The COT20s sample was drawn from the Child Benefit Register and a total of 8,628 families participated, a response rate of 51%, providing data on 8,733 cohort children. The cohort is broadly representative of the population of families with young babies in England, when compared against the benchmark of the 2021 Census and other relevant statistics, although there were some exceptions, including potential under-representation of higher income families and over-representation of primary caregivers of White ethnicity. Compared to previous cohorts, such as the Millennium Cohort Study (MCS; Dex and Joshi, 2004), the sample includes a more diverse group of primary caregivers, including fathers and step-parents, as well as adoptive parents and foster parents.

The results of this first survey reflect ongoing shifts in society, such as children being born to older parents (32 years old on average), a decrease in married couples in favour of unmarried cohabiting couple families (28%), and more complex family compositions, such as those with parents (mostly fathers) residing elsewhere (14%) and parents who consider themselves a couple but are not living together (6%).

In comparison with the Millennium Cohort Study (MCS), the UK-wide longitudinal study which followed a sample of children born in 2000-02, COT20s found higher levels of education amongst primary caregivers (50% with a highest qualification equivalent to an undergraduate or NVQ level 4 or above compared with 30% in MCS), higher labour market participation (71% employed or self-employed compared with 51% in MCS), and higher percentage of parents being on parental leave when the cohort children were on average, 9.5 months of age (32% compared with 2.5% in MCS).

A large proportion of the cohort children and their parents/carers were exposed to COVID-19 infections, with 41% of babies and 57% of parents/carers having experienced

a COVID-19 infection since the child's birth. A COVID-19 infection during pregnancy with the cohort child was reported for 14% of mothers. Nonetheless, the language development of children at 9.5 months was comparable to that measured in children of the same age prior to the COVID-19 pandemic (CDI-UK). Given the exposure of the cohort children and their families to COVID-19 infections, as well as to the social and economic consequences of the pandemic, the COT20s represents an invaluable source for future investigations of the direct and indirect impact of COVID-19 on children's outcomes.

An indication that many families with babies are facing challenging circumstances is the rate of reported financial hardship. A quarter of primary caregivers (25%) reported financial difficulties, as indicated by experiencing at least one of the following: not keeping up with bills, having difficulties managing finances, being unable to afford essential baby items, and having to skip or cut the size of meals. Rising inflation and the increasing cost of living have likely exacerbated existing financial strains experienced by families with young children, which is a concern given previous evidence of the effect of economic stress on child and parent outcomes (Villadsen et al., 2023).

The findings from the first wave of the COT20s study highlighted socio-economic and demographic disparities in children's and parental health and wellbeing. In particular, being a single parent/carer and having a lower family income were both independently associated with scoring above the threshold for risk of anxiety and depression, higher levels of loneliness and poorer general health in primary caregivers, and their children were at greater risk of preterm birth and poorer general health. For example, compared to coupled parent/carers, single parents were twice as likely to score above the threshold for risk of depression and also twice as likely to report feelings of loneliness; furthermore, they were about two thirds more likely to report not having good general health themselves or that their child was not in good health. Primary caregivers in the lowest income quintile were approximately six times more likely to score above the threshold for risk of depression, five times more likely to report that their children were not in good health and had twice the rate of preterm births, than those in the highest income quintile. The findings highlight the psychological stress and poorer health experienced by families with lower incomes and by single parents, which may place their children at greater risk of poorer outcomes, and as such may benefit from greater policy support.

The home environment plays a crucial role in shaping children's social, emotional, and cognitive outcomes. Initial findings from the COT20s study suggest that primary caregivers typically frequently engage their babies in a variety of stimulating activities and interactions in the home. It was notable however that these early experiences showed evidence of socio-economic disparities even in the first year of life, with children in lower income families being exposed to stimulating activities less frequently that those in higher income families. Further, as expected, the frequency of home learning activities was associated with the cohort children's early language abilities. Those who were more frequently exposed to stimulating activities, such as being read to, turn-taking games and

pretend games were reported to understand, on average, more words. For example, on average, children in the lowest third of home learning scores understood 1.43 fewer words than those in the middle third, and 0.91 fewer words than children in the highest third. The longitudinal design of COT20s, with annual data collection and the enhancement of data collection using the BabySteps smartphone app, will provide in-depth evidence for charting the longitudinal profile of children's development and for understanding whether these associations are causal and what the key mediating and moderating mechanisms might be.

Early childhood education and care (ECEC) services are a key element of government support for families with young children. Currently, government funded ECEC entitlements are not provided to children aged under 2 years (when a proportion of children become eligible for the 15-hour entitlement for disadvantaged 2-year-olds) and universal the entitlement begins at age 3. Findings from COT20s indicate that the majority (57%) of families with children aged around 9 months had not used regular ECEC. Of those that had, the majority had used *informal* childcare provided by relative/friends, particularly grandparents (who had provided regular care for around a third of families (36%)). One in eight families (13%) had used formal childcare (such as day nurseries or childminders). There was significant variation in the use of *formal* ECEC. Children in families with lower incomes and single parent families were less likely to receive formal ECEC, a finding likely linked to the significant cost of childcare for families with children younger than 2 years (Farquharson & Olorenshaw, 2022). Providing evidence on the role of early childhood education and care settings in family life and in children's outcomes is a key objective of the COT20s study. Future waves of COT20s will capture the use of ECEC provision in each inter-wave period, the take up of available government support programmes, and measure key indicators of formal ECEC provision at 3 and 4 years of age.

Another key area of government support for families with young children are community health and wellbeing services, including those provided via the Family Hubs and Start for Life programmes, which aims to reduce inequalities in health and education outcomes for children and families. Families taking part in the COT20s study reported having high rates of contact with professionals supporting families with babies (for example, 97% having seen a health visitor and 87% had seen a general practitioner), despite some of the challenges that such services had faced during the COVID-19 pandemic. Overall, 24% of primary caregivers reported experiencing difficulties accessing a GP and 19% reported difficulties accessing a health visitor. Socio-economically disadvantaged families reported difficulties accessing a GP more frequently than more socio-economically advantaged families, with 25% of those in the lowest income quintile reporting difficulties when accessing a GP compared to 22% in the highest income quintile. Notably, the opposite applied in relation to health visitors, with more socio-economically advantaged primary caregivers reporting more difficulties with access: primary caregivers in the highest education group were seven times more likely to report difficulties accessing

health visitors compared to those in the lowest education group. It will be valuable to examine patterns of access to health and family services in more depth as the Family Hubs and Start for Life programme evolves, both with future data from the COT20s study and from direct service data.

COT20s participants will be recontacted annually and invited to take part in further waves of data collection when their children are aged 2, 3, 4 and 5 years.

1 Introduction

Summary

The first 5 years of life are critical in determining children's development, including their social and emotional wellbeing, cognitive skills and ultimately their long-term academic success. A range of influences operating during this time play key roles in driving differences in outcomes. Extensive evidence shows, for example, that early learning, behaviour, and educational attainment show marked socio-economic inequalities and that the home environment plays a key role in these early developmental inequalities.

There are also good indications from past evidence that early education and care settings can improve children's outcomes and act to reduce these inequalities. By the same token, differences in quality and access to such settings may also widen them. Broadly speaking, early caregiving interactions act as the motor to children's development. Understanding the contemporary factors that affect early care is critical for developing robust early years policy.

The COT20s study is the first nationally-representative cohort of babies in England since the millennium, and, as a result of its unique timing, it is ideally-positioned to provide insights into the extent to which this cohort of babies has been directly and indirectly affected by the COVID-19 pandemic and the rising cost of living, as well as the role of other significant social changes, such as the near ubiquitous presence of digital technology in family life.

By measuring these factors and, in key instances, comparing them with previous cohorts, the COT20s cohort can provide vital information regarding the experiences and outcomes of children growing up in this post-pandemic era.

While the data will become increasingly powerful as data collection progresses annually up to age 5 years, this report, based on cross-sectional analyses of the first wave of data collection at age 9 months, addresses several key questions about the unique circumstances and experiences of babies and their families in England in the early 2020s, including the extent of socio-economic disparities in the home environment and babies' early development.

1.1 Children of the 2020s study

1.1.1 Background

The early years represent an exceptionally important period of human development, marked by rapid brain growth and the establishment of foundational abilities critical to life-long success (Unicef, 2017). When children thrive in the first 5 years of life, their capacity to access and benefit from later formal education is greatly enhanced, with positive implications for their long-term trajectories and life chances (Ipsos MORI, 2020). For this reason, supporting early child development is a key element of policymaking aimed at promoting wellbeing, individual and social development, educational attainment and later productivity in employment (see e.g., Department of Health and Social Care, 2021). Designing such policies depends in critical ways on the availability of good data regarding a range of aspects of early life across the population (such as, but not limited to, the home environment, the need for and use of early childhood education and care, service use, and early health and development) as well as data on the social and economic factors that can lead to disparities in early outcomes and unmet needs of families with young children. National cohort studies, for which the United Kingdom (UK) is widely recognised as a world leader, play a vital role in producing such data and have been instrumental in shaping UK policy (Bynner & Joshi, 2007).

The COVID-19 pandemic, and the public health measures that were implemented to mitigate its impact, caused extensive disruption to children and families globally, and while children were comparatively less at risk from the illness itself, their healthcare and education were severely impacted (Hefferon et al., 2021). Now that the public health restrictions have been lifted, it is vitally important to understand what lasting impacts exist for babies born during the pandemic and their families as a direct and indirect effect of the COVID-19 pandemic. Evidence on this is currently scarce, but key concerns centre around the effects of viral exposure during pregnancy, ongoing disruption to health and community services for children and families, changes to patterns of work and childcare, and, perhaps most significantly, the economic impact of the pandemic on families, which has been exacerbated by rising inflation, giving rise to increasing cost-of-living pressures.

Previous cohort studies provide important information from which to estimate the likely effects of these factors on young children. The evidence is particularly strong regarding the role of economic stress on children's early development. Key data for the UK comes from the Department for Education's Study of Early Education and Development (SEED; Department for Education, 2015) in England, a study involving a cohort of children born in 2010-12 who were followed from the age of two, and the earlier UK-wide MCS (Joshi & Fitzsimons, 2016), a cohort consisting of children born in 2000-2002 who were studied from the age of 9 months (a starting age comparable to the COT20s study).

SEED data showed that children between 4 and 5 years of age in the most economically disadvantaged households were less likely to achieve a good level of development on

the Early Years Foundation Stage Profile (Melhuish & Gardiner, 2020) across all outcome domains, compared to those in the least disadvantaged households. These patterns of socio-economically graded outcomes tended to persist over time (Melhuish & Gardiner, 2021) and were evident in objective researcher-administered assessments of cognitive ability as early as age 3 years (Melhuish et al., 2017).

Data from the MCS also indicated large socio-economic inequalities in cognitive and socio-emotional development by age 3. These outcomes also notably varied by the child's sex and ethnicity, as well as by household structure and maternal mental health. Evidence from MCS has also shown marked differences in communication, language, literacy, and early mathematics attainment at age 5 between children in the lowest and highest quintiles of family income (Mensah & Kiernan, 2010). Indeed, extensive analyses of data from the MCS show not only that family income is associated with large differences in cognitive and socio-emotional outcomes, but that this gap widens between age 3 and 5 years (Dearden et al., 2011; see also Kelly et al., 2011).

Early childhood development has an important influence on later outcomes, including educational attainment at the end of secondary education (Cattan et al., 2022) and economic inequalities are associated with poorer long-term outcomes across multiple areas of development. For example, data from the MCS indicate that children who experienced poverty at any point during their childhood had, on average, worse mental and physical health outcomes at age 14 compared to those who did not experience poverty (Lai et al., 2019). Furthermore, disadvantaged socioeconomic status in early life was strongly associated with several adverse health and educational outcomes in adolescence up to the age of 17, with the association being particularly strong in relation to multiple (co-occuring) poor adolescent outcomes across domains (health, health behaviour, educational achievement) (Villadsen et al., 2023).

Moreover, comparisons between SEED and MCS have revealed that socio-economic inequalities in early cognition and socio-emotional development at age 3 were remarkably stable in magnitude: there was no significant change in the gap in development between children with lower- and more highly-educated mothers, or those in the most and least deprived areas, between these two cohorts; while evidence from older UK cohorts (such as the 1970 British Cohort Study) also shows that the impact of early socio-economic, environmental and developmental inequalities persist into mid-adult life (Cattan et al., 2022).

To the extent that the pandemic and the rising cost of living creates greater economic pressure on families and widens existing socio-economic disparities, past evidence suggests that children's development and early attainment may be adversely affected. Tracking whether, and for whom, such impacts occur will be critical for developing effective policy to mitigate impacts on children's educational and social outcomes.

When developing policy related to the impacts of socio-economic factors on children's outcomes it is important to understand the diverse mechanisms driving them. Evidence from past research clearly underlines the importance of children's interactions with caregivers, both at home and in their ECEC settings, as important mediating processes linking socio-economic and other contextual stressors to children's outcomes. Numerous longitudinal studies point to the importance of parent-child interactions that are characterised by timely and appropriate responsiveness to the child's cues as important predictors of language, cognitive and socio-emotional outcomes (Madigan et al., 2019; Denault et al., 2022). These childrearing processes appear to be affected by the socio-economic circumstances of the family, both directly and indirectly through the parents' experiences of stress and poor mental health (Savage et al., 2019).

Evidence also indicates that the provision of stimulating early childhood opportunities in the home, such as book reading, play, parental support and involvement also vary by household socio-economic circumstances (Bradley & Corwyn, 2002) and consistently predict better later cognitive, language and socio-emotional outcomes. UK data from the MCS showed that children from families in the lowest income band were 7 to 8 times more likely to have social and emotional difficulties at ages 3 and 5 years, and scored lower than those in the highest income bracket for verbal ability at age 3 years, a disparity which widened at age 5 (Kelly et al., 2011). A third to a half of these differences could be explained by differences in the home learning environment, parental skills, and parental mental health (Kelly et al., 2011). More recent evidence from SEED revealed that children with higher home learning environment scores at ages 2, 3 and 4 years achieved higher Key Stage 1 outcomes in all subjects assessed and on the phonics checks at age 7 years (Melhuish & Gardiner, 2021). SEED also found that parenting factors were linked to attainment. Permissive parenting, lower parental limit setting and lower levels of warmth in the parent-child relationship during the early years were all linked to poorer outcomes at Key Stage 1 (Melhuish & Gardiner, 2021). As families in England face increasing financial pressures, identifying and monitoring any resulting changes in these childrearing processes will be important for early education and care policy.

The role of early education and care settings is an important aspect of policy designed to address inequalities in early child development (see e.g., The Parliamentary Office of Science and Technology, 2021). These settings provide important opportunities for children to learn through play and to develop the social and self-regulatory skills important for their later schooling. Evidence from around the world generally points to the positive impact of attending early education settings on early attainment, and shows that benefits may also extend beyond educational outcomes to socio-emotional wellbeing and behaviour (Barnett, 2008). However, it seems clear that such gains are greatest in higher quality ECEC settings (OECD, 2011, Baker, 2011), and are also typically found to be most beneficial for disadvantaged children (Melhuish et al., 2014), while there may be fewer benefits or even disadvantages for children from more advantaged backgrounds

(Elango et al, 2016). There is also mixed evidence about the extent to which benefits are long-lasting: in England, recent evidence suggests small positive effects of an increase in funding of free pre-school education at age 3 on children's school readiness at age 5, which fades out by age 7 (Blanden et al., 2016). While some benefits are found to fade, others appear to last into adolescence (Sylva et al., 2008), and there is some evidence of modest gains for nursery and pre-compulsory education into mid-adulthood (Goodman & Sianesi, 2005; Batty et al., 2018).

ECEC provision was substantially impacted by the COVID-19 pandemic, with many centres reducing their opening hours due to staff illness and, at the peak of the pandemic, high numbers of ECEC centre closures were observed, alongside falling attendance. Given the evidence of benefits to early childhood development of ECEC attendance for the most disadvantaged children, it is vital to track attendance in these settings in the post-pandemic period and monitor its effects on outcomes. There is post-pandemic evidence of lower attendance in ECEC settings among economically disadvantaged families (Nesta, 2023), and uptake of government-funded early years provision among eligible 2-year-olds remains lower than that for 3- and 4-year olds (Department for Education, 2023). As economic shifts occur as a result of the pandemic and rising cost of living, affecting both families and ECEC providers, and new early years policies come into effect, good data on attendance and outcomes will be important. Furthermore, changes in the landscape of providers and the economic circumstances of families may affect not only capacity and uptake but also ECEC quality and the profile of families accessing high-quality ECEC. This is important because research consistently identifies significant variability in provider quality and demonstrates that such differences impact children's early attainment (The Parliamentary Office of Science and Technology, 2021). Measuring ECEC quality, identifying patterns of uptake and examining associations with robust indicators of early childhood development will therefore be vital in the coming years.

In sum, it is critical to gather new data on actionable risk factors linked to early childhood development, so that evidence-informed preventative programmes and educational policies can be developed to mitigate any adverse effects of the pandemic and the subsequent rising cost of living on children. The COVID-19 pandemic had a dramatic impact on society, affecting patterns of work, the availability and form of delivery of childhood health and social services and of course schools and early education and care settings. Considerable concern remains about the impact of these events on young children, particularly in their early motor and language development (Shuffrey et al., 2022) and the potential long-term impacts for those children whose development has been adversely affected. The rising cost of living also presents acute economic pressures on families with young children whose effects need to be understood.

At the same time, a number of policy changes have been introduced in recent years that are directly aimed at enhancing support for early child development, including early education reforms in 2021, the early years COVID-19 recovery programme, the

introduction of family hubs through initiatives such as the Family Hubs and Start for Life programme (Department of Health and Social Care & Department for Education, 2021). The Spring Budget 2023 childcare expansion, while predominately focused on increasing parental employment, aims to positively affect the affordability of childcare for parents in the coming years. The quality and quantity of the provision available will be crucial in determining whether this has a positive impact on early childhood outcomes.

The COT20s study is a large-scale nationally representative cohort study of infants born in England in September, October, and November of 2021. It is designed to measure and track the circumstances and outcomes of babies and their families in the post-pandemic era. The study focuses specifically on England, as a primary aim is to inform education policy for England (which is devolved to the four nations of the UK). The study will employ annual waves of data collection from 9 months until 5 years of age and will include ECEC surveys at ages 3 and 4 years. The current report provides an overview of the data collected in the first wave of the study and reports on several important early outcomes relating to families' socio-economic circumstances, their child's early health and development, parents' own health and wellbeing and their use of services and childcare since their child was born.

1.1.2 Aims and objectives

The COT20s study aims to examine the relationship between children's early life circumstances, their home environments and early learning opportunities, both formal and informal, and their developmental and educational trajectories.

1.1.3 Overview of study methodology

Children of the 2020s is a five-wave longitudinal study with annual data collection, including face-to-face interviews at 9 months and 3 years, and online and telephone interviews at 2, 4 and 5 years. The study includes measures of children's outcomes, including language, cognition and socio-emotional development, in-home video observations of parent-child interactions, and innovative assessments of childcare settings. Participants are invited to register on a smartphone app called BabySteps, which is used both as a participant engagement tool and to collect data through monthly research activities. Primary data collection is supplemented by record linkage from education and health records. Anonymised data will be made available to suitably qualified researchers for research and policy purposes.

Figure 1 displays an overview of the waves of data collection, the planned modes of collection as well as the topics that will be covered.

Figure 1. Overview of COT20s study

Timing	9 months	2 years	3 years	4 years	5 years
Mode	Face-to-face	Online	Face-to-face	Online	Online

Measurement strategy

- Standardized questionnaires (CAPI)
- Objective developmental assessments
- Smartphone microsurveys, video and audio capture
- Record linkage

Domain

- Child developmental outcomes
- The home environment
- Background and context: parental mental health, wellbeing, relationship quality, social support, demographics, and contextual/community variables
- Provision of services: early childhood education and care, community provision, NHS, social care and third sector use
- Experiences and life events

1.2   Content of the current report

This report provides a descriptive summary of the COT20s cohort and the primary data collection undertaken at Wave 1, when the infants were approximately 9 months of age. Although the primary objectives of this report are descriptive in nature, the report presents analyses of socio-economic inequalities in key variables as a function of family income, primary caregiver education, primary caregiver ethnicity and family type (being a single/carer parent household or coupled parent/carer household) and explores the key role of the home environment for babies' early language development.

1.2.1 Methodology

Full details of the design of the first (Wave 1) mainstage interview of the COT20s study can be found in the accompanying technical report (Ipsos & UCL 2023). Briefly, the mainstage fieldwork for the first wave of the study took place in-person between June and November 2022, with a total of 8,628 interviews with primary caregivers. This included 8733 cohort children with just over 1% of families in the study having twins or triplets. The quantitative survey completed by primary caregivers contained questions on a range of topics including key socio-demographics, their child's health and development, their own health and wellbeing, early childhood education and care arrangements, and service usage. The cohabiting partner of primary caregivers and/or the cohort child's other parent were also invited to take part in an online survey. The study requested consent for linkage to the Department for Education administrative records and additional consent was requested from parents for linkage to their child's, and their own, National Health Services (NHS) records.

In addition to the surveys, primary caregivers and non-primary caregivers were invited to download and take part in the BabySteps study app. This is a free smartphone app that primary caregivers could opt-in to using, where a series of inter-wave mini surveys were sent to participants to complete each month. The current report features data from the first BabySteps mini survey.

The sample for the COT20s study was selected from the HMRC Child Benefit Register. Children in England who had been born between September and November 2021 were eligible to be sampled. The study design included a 50% sample boost for families in regions in the highest quintile of the Income Deprivation Affecting Children Index (IDACI), in order to yield sufficient sample for subgroup analyses of economically disadvantaged families. The data were weighted to correct for this disproportionate sampling and ensure the results are representative of the sampled population as a whole.

It is important to note that, although the Child Benefit Register (CBR) was identified as the most appropriate available dataset to use as the sample frame for the COT20s study, higher income families (those earning over £100,000 per annum) are under-represented to some extent. Some higher income families do not register for child benefit because

families where one parent earns in excess of £50,000 per year attract the High Income Child Benefit Charge (HICBC) (though note in 2020-21, 355,000 individuals paid the HICBC). Data from the 2019 Childcare and Early Years Survey indicated that in total, 87% of families with children under 1 year claim child benefit. Among families earning between £65,000 and £99,000 per year 73% claim child benefit; but approximately one third of families earning over £100,000 per year claimed child benefit.

The report conducted comparisons by demographic variables, such as primary caregiver (or cohort member where otherwise stated) ethnicity, family income, primary caregiver education, and family type (single or coupled parent/carer), to highlight socioeconomic differences in the cohort. In the report the associations between language comprehension development and the home learning environment was assessed. Associations were considered statistically significant at a 5% threshold (p value = 0.05). Further details of the analysis methodology and results are presented in Appendices 1 and 2.

1.2.2 Aims and objectives of current report

As a baseline report of Wave 1 of the COT20s study the report will (a) provide key information to aid understanding of the characteristics of this cohort of children and (b) provide the baseline for analysing the data collected from these families at age 2, 3, 4 and 5 years (such as changes over time and the influences of early experiences on later outcomes). Specifically, the report is divided into five sections covering each of the following aims, to:

1. Describe the socio-demographic and economic profiles of the participating families.

2. Describe children's and primary caregivers' health and wellbeing, and explore differences related to family demographics.

3. Describe the home environment and explore differences related to family demographics and the role of the home environment in early language development.

4. Describe patterns of early childhood education and care use and any differences related to family demographics.

5. Describe families' use of services and any differences related to family demographics.

1.2.3 Report conventions

All statistics reported herein are weighted based on the probability of being sampled. This means that the frequencies and analyses presented in this report therefore represent

population estimates. Weighted and unweighted bases (denominators) are reported in tables for descriptive purposes. Missing data has been removed from denominators.

All percentages have been rounded to the nearest whole number, therefore, sums may not equal 100%.

Where differences by family demographics are reported, these differences are statistically significant. Where associations between language and the home environment at 9.5 months are reported, these associations were statistically significant.

2 Baseline profile of study participants

Key findings

- **Cohort children**
  - The average age of children was 9.5 months. Ninety-five percent were between 8 and 11 months, with the rest aged 12 to 14 months.
  - Two percent of children were a twin or triplet, and the children's sex was evenly split between males and females, reflecting population statistics.
- **Primary caregivers**
  - The survey took place with the cohort child's primary caregiver, defined as the parental figure who spends the most time caring for the child.
  - 92% of primary caregivers were the cohort child's biological mother. Their average age was 32 years, similar to Census 2021 population statistics.
  - In 7.4% of families the child's biological father was their main caregiver.
  - Seventy-one percent were employed or self-employed, including the 32% who were on parental leave at the time of the interview (when their child was age 9.5 months on average). Twenty-one percent were not working and looking after family, similar to Census 2021 population statistics.
  - Half of primary caregivers (50%) were qualified to degree level or above; around a quarter (24%) held A levels or equivalent as their highest level of qualification; 17% held GCSEs and 8% had no qualifications.
- **Households**
  - The majority of households had two parents/carers in residence, while 19% were single parent/carer households.
  - The ethnic profile of the cohort children was similar to the 2021 Census.
  - Just over three quarters (77%) of families spoke only English at home. Nineteen percent spoke other languages at home as well as English. The remaining 4% did not speak English at home.
  - Half of families (50%) owned their home. A quarter (24%) rented privately, and almost one fifth (18%) were renting from a local authority or housing association.
- **Housing problems and financial strain**
  - One in six families (17%) reported problems in their home relating to damp, faulty appliances, heating/ventilation, or domestic hygiene/refuse.
  - Two in five families (41%) received at least one means-tested benefit.
  - A quarter of families (25%) were experiencing at least one of the following types of financial strain at the time of the survey (June to Nov 2022):
    - not able to keep up with bills/debts;
    - finding it very difficult to manage financially;
    - skipping or reducing the size of meals due to lack of money; unable to afford essential baby items.

This chapter describes the baseline profile of families in the COT20s study, covering the demographics of the cohort children and their primary caregivers, and differences in household circumstances. Where available, comparisons are made with existing population datasets to assess the representativeness of the cohort or to evaluate whether some populations characteristics have changed over time[1].

2.1 Cohort children

2.1.1 Multiple Births

Two percent of cohort children were either a twin or triplet. In 1.3% of families, the cohort members were twins, and in fewer than 0.1% of the families the cohort members were triplets. These numbers are similar to the 2021 Census of England which found that 1.37% of births were twins, triplets or quadruplets (Office for National Statistics [ONS], n.d.-a).

2.1.2 Sex

Forty-nine percent of cohort children were female and 51% were male. These numbers are the same as 2021 Census of England and Wales (ONS, n.d.-b).

2.1.3 Age

Interviewers aimed to make the first contact with the primary caregiver in the month that their child turned 9 months old. The majority of interviews were conducted when the cohort child was between 8 and 11 months, and the average age of the cohort children at the time of the interview was 9 and a half months. Table 1 shows the range of ages at the time of the interview and the percentage of cohort children who were each age.

---

[1] Where there are 2021 Census comparisons, the closest available population published Census statistics was used; this includes, variously, all families with children in England; all families with a child under 12 months in England and Wales; children born in England and Wales in 2021; and women who gave birth in England and Wales in 2021.

Table 1. Age in months of cohort child at wave 1 interview

Cohort child age at interview	Percentage (%)
8 months	17
9 months	42
10 months	22
11 months	14
12 months	3
13 months	2
14 months	<1
Unweighted Base	*8732*
Weighted Base	*8731*

Base: All cohort children (including twins and triplets).   Source: COT20s wave 1
Table shows column %, all derived using weights

2.2 Main respondent, primary caregiver

2.2.1 Relationship to cohort child

As explained in Chapter 1, the primary caregivers in the survey were defined as the parental figure who provided the majority of care for the cohort child. The majority of primary caregivers were biological parents (99.7%), most of whom were mothers (92%). The remaining 0.3% of the primary caregivers were a mixture of adoptive/foster/step-parents, or grandparents or other relatives with legal responsibility for the child. The composition of the cohort with respect to the relationship of the main caregiver to the cohort child is presented in Appendix 3.

2.2.2 Gender

Primary caregivers were asked to report their gender. 93% were female and 7% were male.

2.2.3 Age

The majority of primary caregivers were between 25 and 46 years of age, with an average of 32 years. The average age of primary caregivers is very similar to that reported by 2021 Census for England and Wales where the average age for mothers who gave birth that year was 30.9 years (ONS, n.d.-b).

Figure 2 shows the distribution of the primary caregivers' ages. The age range was 15 to 62 years, with 1% of primary caregivers aged 19 years or younger (compared to 0.6% reported for mothers in England by the Office for Health Improvement and Disparities in 2021) and less than 1% aged 46 years or older. Again, these figures suggest that the cohort is similar to population figures at the lower end of the parental age spectrum.

Figure 2. Primary caregiver's age in years at the time of the interview
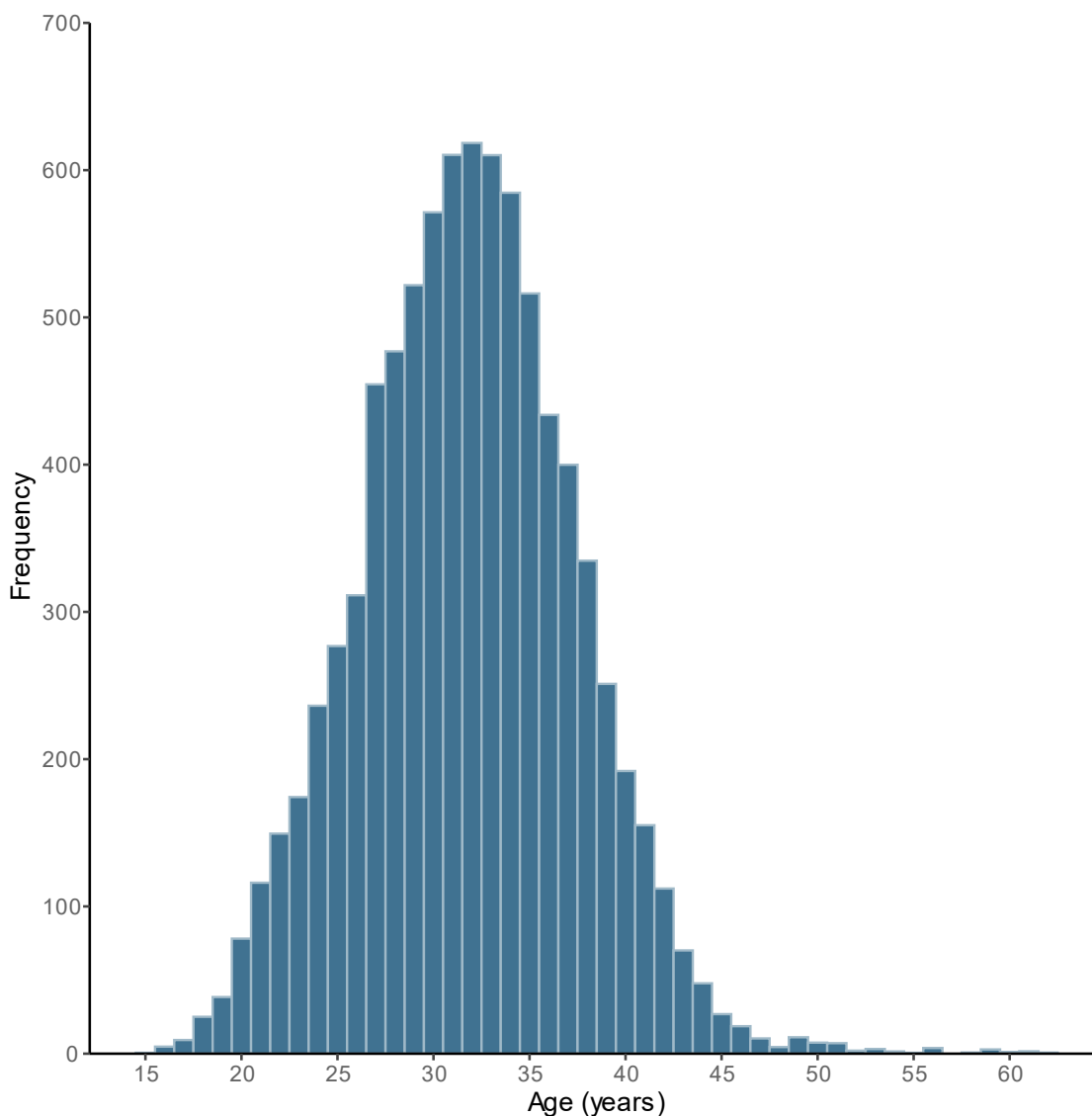
Base: All primary caregivers   Source: COT20s wave 1

2.2.4 Primary caregiver education

The primary caregivers were asked to report what academic and/or vocational qualifications they had. To allow comparisons of highest level of qualification across academic and vocational qualifications, qualifications were equivalised across the two kinds of qualification, resulting in a scale ranging from no qualification to level 5 equivalised qualification.

As shown in Table 2, half of primary caregivers (50%) were qualified to degree level or above: 31% held an undergraduate degree or NVQ level 4/5 or equivalent, and 19% held a postgraduate degree or equivalent, as their highest qualification. Around a quarter of parents (24%) held A levels or equivalent as their highest level of qualification, 17% held GCSEs and 8% had no qualifications.

Table 2. Primary caregivers' highest equivalent qualification level

Highest level of qualification	Percentage (%)
Level 5: postgraduate degree or professional qualification	19
Level 4: undergraduate degree or NVQ level 4/5	31
Level 3: A levels or NVQ level 3	24
Level 2: GCSEs or NVQ level 2	17
Level 1: NVQ level 1	<1
No qualification	8
Weighted base	8560
Unweighted base	8551

Base: All primary caregivers   Source: COT20s wave 1
Table shows column %, all derived using weights.

The methodology of equivalising across academic and vocational as described by MCS sweep 6 (Agalioti-Sgompou et al., 2017) to allow for comparability. See Appendix 4 for full details of which qualifications are categorised into which level.

2.2.5 Primary caregiver main activity

The primary caregivers were asked to report their main activity at the time of the interview (when the cohort children were aged 9.5 months on average)[2]; the findings are displayed in Figure 3. The majority (71%) of primary caregivers were in employment (65% employed and 6% self-employed), with 40% employed full-time and 29% employed part-time (defined as less than 30 hours a week). The percentage of primary caregivers who were employed includes 39% who were currently working and 32% who were currently on parental leave from their employment. In total 68% of primary caregivers had taken parental leave, as an additional 36% had previously taken parental leave, which had already concluded before the interview[3].

---

[2] Respondents who were currently on parental leave at the time of the interview were asked to prioritise reporting what that they were doing before they started their parental leave. Similarly, if the respondent had multiple occupations, they were asked to prioritise reporting paid work over any other activity

[3] This proportion of primary caregivers who had taken parental leave in the past (36%) included both those who returned to work after parental leave ended, and those who did not return to work and that at the time of the interview (when their children were 9.5 months on average) were not in paid work.

In total 27% of primary caregivers were economically inactive. This comprised of 21% who were looking after family (including the cohort child) and 5% who were out of work because of poor health or for other reasons and 1% who were full time students.

Figure 3. Primary caregivers' main activity
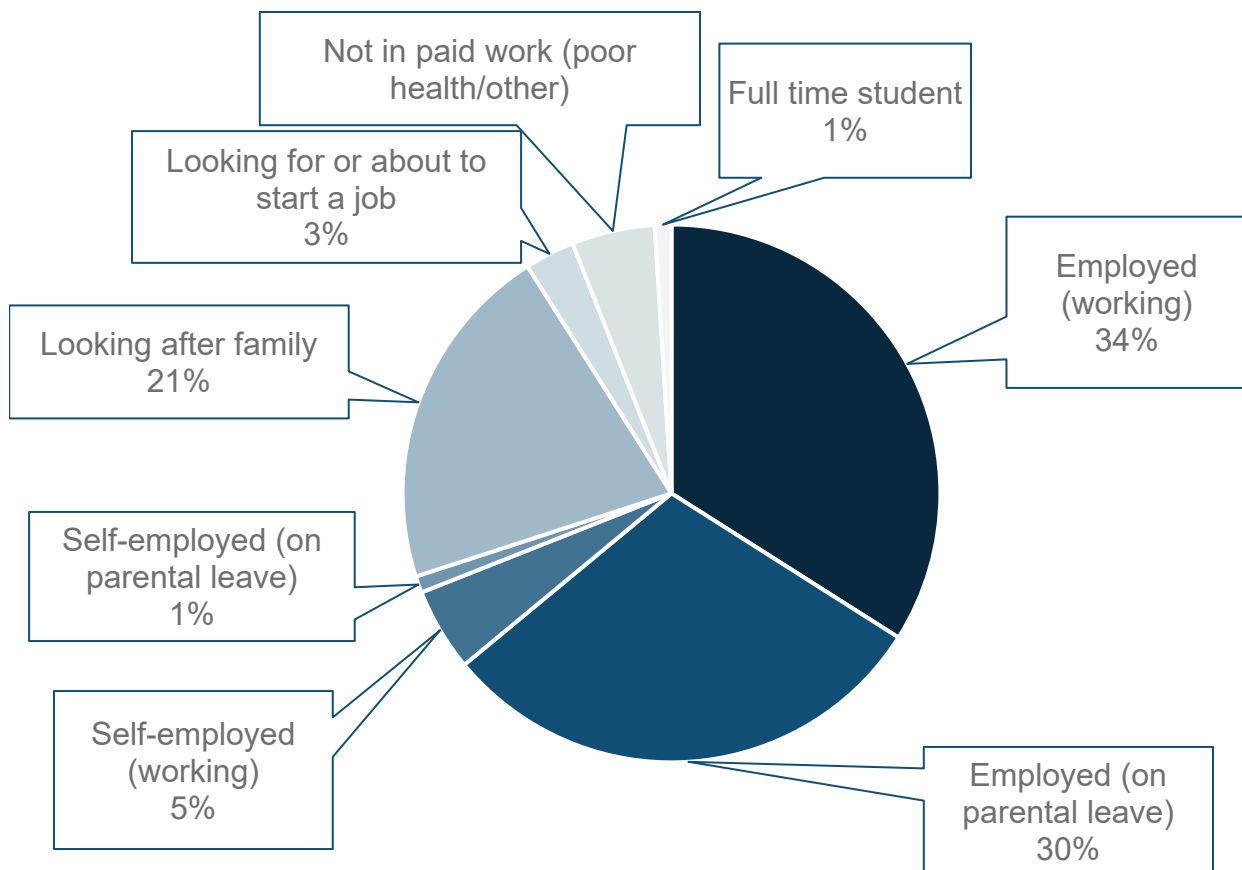
Base: All primary caregivers; unweighted base = 8579; weighted base = 8567.   Source: COT20s wave 1. Less than <1% of main respondents reported unpaid voluntary work, paid apprenticeship, unpaid traineeship/government training scheme, part-time student or retired as their main activity.

The families taking part in the COT20s study had very similar working patterns to families with children in the 2021 Census in England, which found that of women with a child aged between 0 and 12 months, 22% were looking after family and 73% were employed (ONS, n.d.-c). The COT20s cohort therefore appears to be representative with respect to primary caregiver employment.

2.2.5.1 Primary caregiver occupational socio-economic classification

The primary caregiver's occupation was classified using the National Statistics Socio-Economic classification (NS-SEC; ONS, n.d.-d), following the ONS 2020 guidance[4]. Table 2 displays percentages of primary caregivers in each of the NS-SEC categories. The higher and lower managerial and professional occupations together represent the most common socio-economic classes, with 40% of primary caregivers falling into these two categories.

Table 3. Primary caregivers' NS-SEC category.

NSEC category	Percentage (%)
1 Higher managerial and professional occupations	12
2 Lower managerial and professional occupations	28
3 Intermediate occupations	17
4 Small employers and own account workers	5
5 Lower supervisory and technical occupations	3
6 Semi-routine occupations	13
7 Routine occupations	10
8 Never worked and long-term unemployed	5
Not classified	7
Unweighted Base	*8605*
Weighted Base	*8590*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

---

[4] Briefly, the occupation of each primary caregiver was coded to the unit groups of the Standard Occupational Classification 2020 (SOC 2020) based on details of their employment status. For primary caregivers who were out of work at the time of the interview (when their children were 9.5 months on average), NS-SEC was calculated based on details of their most recent employment. This was combined with information on employer size, any managerial responsibilities and training requirements.

2.3 Household demographics and socio-economic circumstances

2.3.1 Family composition

The majority (81%) of the cohort children lived in households with two parents in residence while 19% of families in the study were headed by single parents[5]. These estimates closely match national data from 2019, where 82% and 18% of children were born to parents cohabiting and not, respectively (Kiernan et al., 2022). In 14% of all families (and 70% of single parent families) a biological parent not living in the household was in contact with the cohort child. Six percent of primary caregivers reported to be in a relationship with the cohort child's other parent but were not living in the same household.

When the cohort children were aged 9.5 months on average, 44% of the families had only one child in the household (the cohort child), 37% had two children, 12% had three children and 7% had four or more children (i.e., 16 years old or younger). These figures were similar to those reported in the 2021 Census, where in England 84% of families with children had either one to two children whereas 16% had three or more children (ONS, n.d.-e).

2.3.2 Ethnicity and religion

The majority (76%) of COT20s cohort babies were of White ethnicity. Ten percent were of an Asian ethnic group or were Asian British, and 5% were of Black/African/Caribbean ethnic ethnicity or were Black/African/Caribbean British. Seven percent of the cohort children were of Mixed/Multiple ethnicity, and 2% were of another ethnic background that had not been specified in the question. See Appendix 5 for a full list of ethnicities and percentages of the cohort children belonging to each ethnic group.

According to Census 2021 data, in England and Wales 71% of children born in 2021 were of White ethnicity, 12% Asian, 5% Black/African/Caribbean, 7% of Mixed ethnicity, 2% were of Other ethnic backgrounds and 3% was unknown (ONS, n.d.-a). The COT20s cohort includes a slightly higher percentage of children of White ethnicity than Census data.

The majority (79%) of primary caregivers were of a White ethnic background. Eleven percent were of an Asian ethnic group or were Asian British. A further 5% were of Black/African/Caribbean ethnic group or were Black/African/Caribbean British. Three percent of primary caregivers were of Mixed/Multiple ethnicity, and 2% were of Other ethnic backgrounds. See Appendix 5 for a full list of ethnicities and percentages of the

---

[5] Single parents/carers were defined as those not living with a partner or the cohort child's other parent. However, it includes both parents/carers whose child has contact with another parent (70% of single parents in the sample) and those who are the sole carer of their child.

primary caregivers identifying themselves as belonging to each ethnic group. The OHID Fingertips data (Office for Health Improvement and Disparities, 2021) on births in England for 2021/22 gives the comparable figure of 77% of births to women of White ethnicity.

Just over half of primary caregivers (53%) identified themselves as belonging to no religious group. The majority of the remaining 47% identified as either Christian (32%) or Muslim (11%). The remaining 4% identified as either Hindu (1%), Sikh (<1%), Jewish (<1%) or Buddhist (<1%) or were of other religious identities (<1%). See Appendix 6 for a full list of religions and percentages of the primary caregivers who identified themselves to belong to each.

2.3.3 Languages spoken at home

Just over three quarters (77%) of families spoke only English at home, with a further 19% speaking other languages at home as well as English. The remaining 4% of families did not speak English in the home.

2.3.4 Housing tenure and housing problems

The majority of families either owned their home with the help of a loan/mortgage (47%), or rented from a private landlord (24%), local authority (10%), or housing association (8%). The percentages of the participating families' housing tenure are displayed in Table 4. The proportion of families in privately rented accommodation, which tends to be less secure than own- or local authority-owned housing, is very similar to the 25% figure cited in the 6th Nuffield Series Report on the Changing Face of Early Childhood in the UK (Batcheler et al., 2022, based on data from Bangham et al., 2019).

Table 4. Families' housing tenure

Primary caregiver's housing tenure	Percentage (%)
Own with a mortgage/loan	47
Rent privately	24
Rent from local authority	10
Rent from Housing Association	8
Live with parents	4
Own outright	3
Part rent/part mortgage (shared equity)	2
Housing comes with my work / my partner's work	<1
Live rent free	<1
Live with friends/in hostel/temporary accommodation	<1
Live with other relatives	<1
Pay rent to relatives	<1
Shared ownership	<1
Other	<1
Unweighted Base	*8573*
Weighted Base	*8562*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

2.3.4.1 Problems with quality of home

Primary caregivers were also asked to indicate whether they experienced any issues with their home. The most common reported problems included: damp, mould or condensation reported by 12% of families; faulty appliances reported by 4% of families; problems with heating or ventilation reported by 4% of families; and problems with domestic hygiene, pests or refuse reported by 2% of families. Seventeen percent of primary caregivers reported at least one significant problem with their home. Though not directly comparable, the figure is similar to that reported by the English Housing Survey report, where 14% of occupied dwellings in England in 2021 failed to meet the Decent Homes Standard[6].

---

[6] Decent Homes Standard dwellings must: meet the statutory minimum standard for housing (the Housing Health and Safety System (HHSRS) since April 2006), homes which contain a Category 1 hazard under the HHSRS are considered non-decent; provide a reasonable degree of thermal comfort; be in a reasonable state of repair; have reasonably modern facilities and services.

2.4 Economic circumstances

2.4.1 Family income

All primary caregivers were asked to report their net income from all sources or, if living with a partner, their own and their cohabiting partner's combined net income from all sources (after any deductions, such as income tax or National Insurance). In total there were 1305 respondents (7% of the sample) with missing income data, having declined to answer the survey question related to household income. For ease of interpretation and presentation, the results presented here do not include statistical adjustments for missing data. However, separate analyses were carried out using a missing data adjustment technique called Multiple imputation in order to evaluate the extent to which the statistical estimates and substantive conclusions presented here might be influenced by missing data. These analyses are summarised in Appendix 7. Overall, non-trivial differences between results with and without imputation were rare and small in size. In the instances where we identified a potentially non-trivial difference in a statistical estimate these are noted as footnotes in the relevant section of the report.

In order to allow comparisons of the living standards of different family types, income was equivalised using the Modified OECD scale (Hagenaars et al., 1994; Department for Work and Pensions, 2021) to take into account variations in the size and composition of the family, including the primary caregiver, their cohabiting partner and their dependent children (see Appendix 8 for details on methodology). As noted in the previous chapter, the sample should represent most of the income spectrum across England well, except at the highest end, where a smaller proportion of families are present on the Child Benefits Register and so would not have been available for sampling. Figure 4 demonstrates the distribution of equivalised income across the cohort.

Figure 4. Distribution of equivalised income
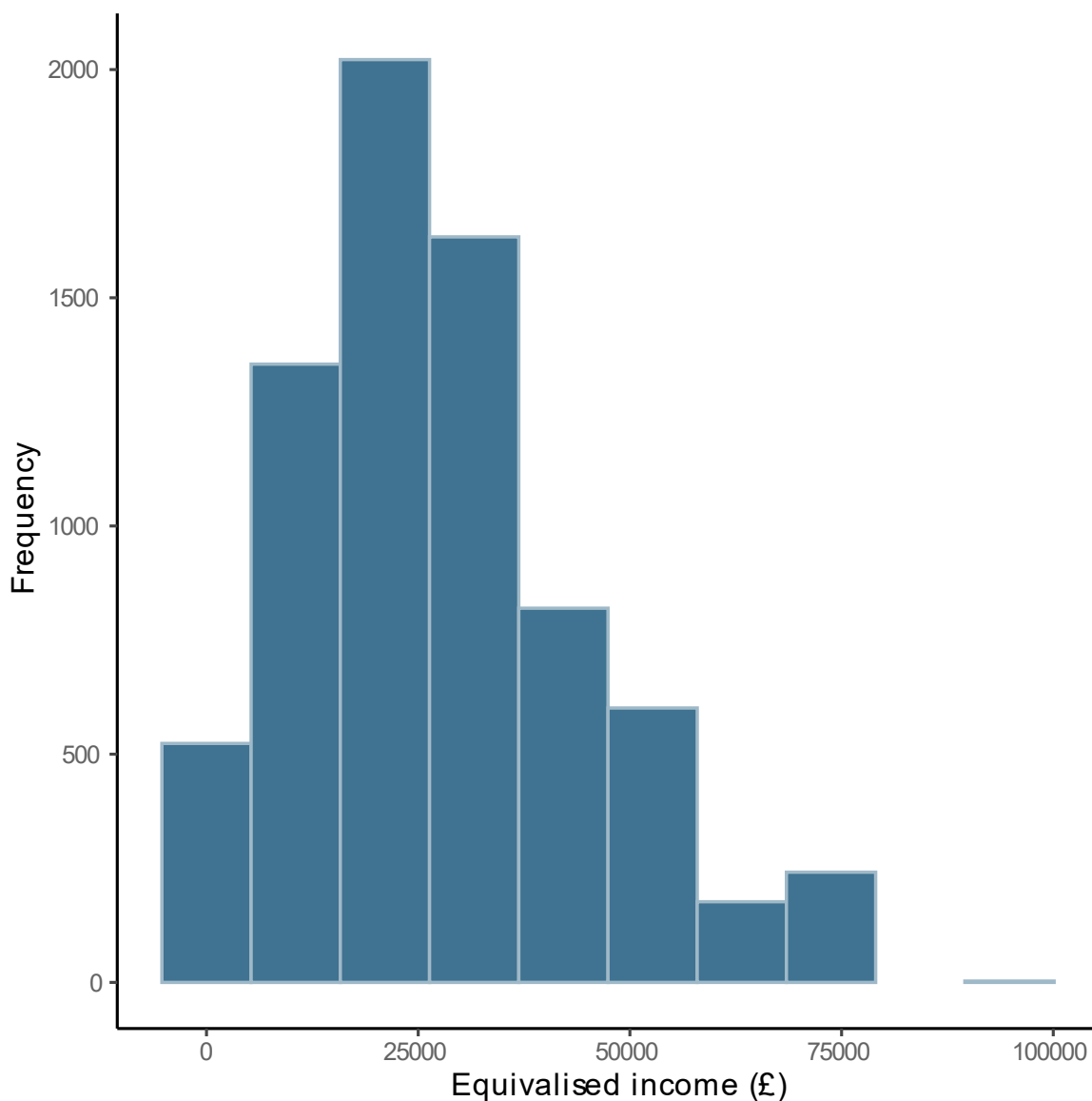
Base: All primary caregivers. Figure shows weighted frequency.   Source: COT20s wave 1

2.4.2 Benefits

The survey included questions about means-tested benefits and those aimed at people with a disability/long term illness and caring for someone with a disability/long term illness. In 43% of families the main parent/carer or their partner was receiving some type of benefit (either means-tested and not means tested), while the remaining 57% of families were not receiving any benefit listed (either means-tested or not means-tested). Focusing specifically on the means-tested benefits (denoted in table above), 41% of families were receiving at least one means tested benefit. Percentages of families receiving each type of benefit listed in the survey is displayed in Table 5 divided by whether it is means-tested or not.

Table 5. Benefits received by primary caregivers and/or their partners

Benefit	Means-tested	Percentage (%)
Universal credit	Yes	31
Working Tax Credit or Child Tax credit	Yes	10
Housing benefit	Yes	10
Free school meals	Yes	9
Council tax support or reduction	Yes	9
Carers allowance, Personal independence payments, or Disability Living Allowance	No	5
Income support or Job Seeker's Allowance	Yes	1
Statutory sick pay	No	1
Employment and Support Allowance	No	<1
Pension credit	Yes	0
None of these	-	57
Unweighted Base	-	*8457*
Weighted Base	-	*8453*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

2.4.3 Financial strain

Primary caregivers were asked to indicate their experience of financial difficulties through questions about managing finances, keeping up with bills and debt repayments, and having the funds to buy food and baby essentials. Note the survey was conducted in the second half of 2022 in the context of the rising cost of living. Figure 5 displays families' financial circumstances.

Figure 5. Families' experience of financial strain
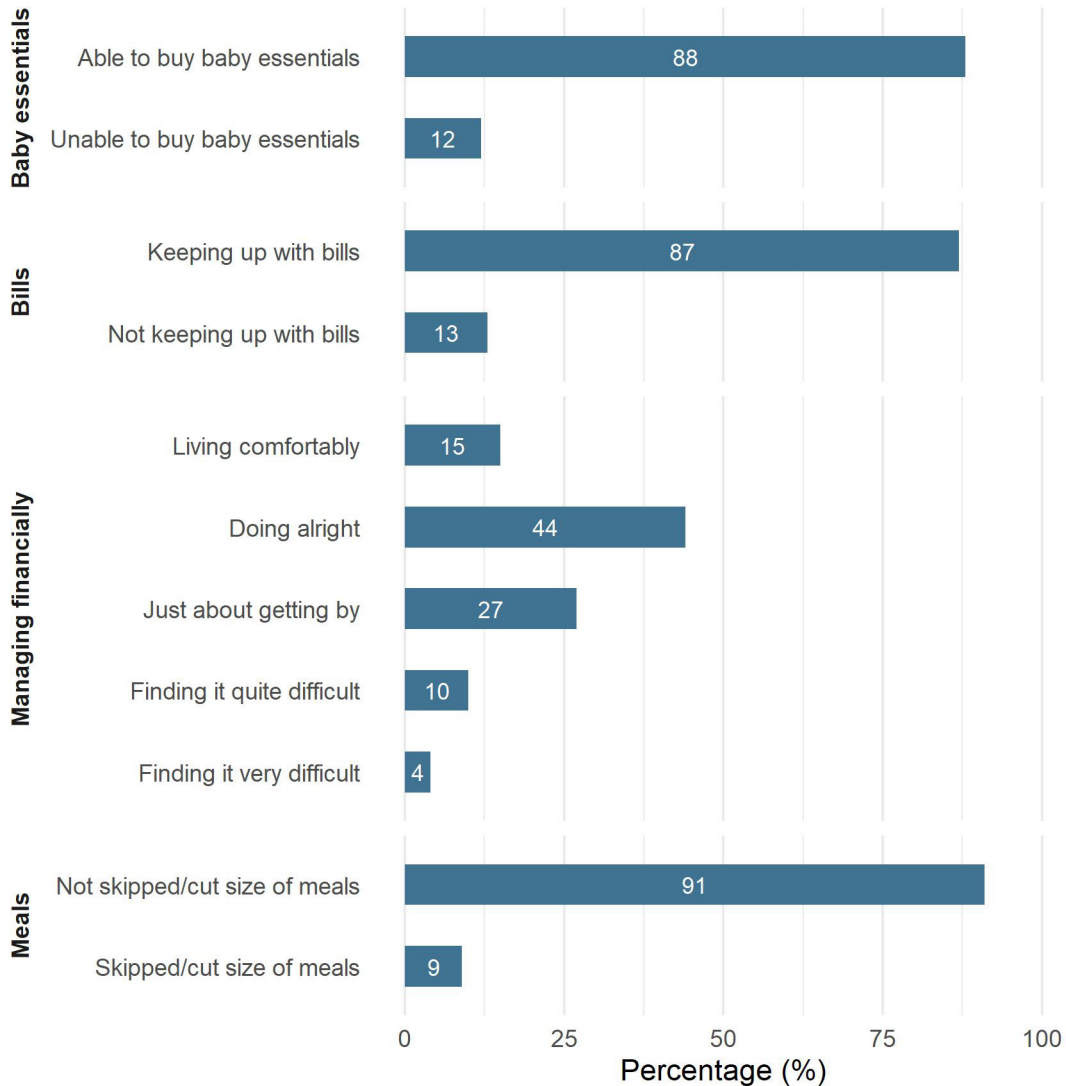
Base: All primary caregivers. Figure shows %.   Source: COT20s wave 1
Weighted bases: 7544 (baby essentials, 8459 (bills), 7506 (finances), 7634 (meals). Unweighted bases: 7519 (baby essentials), 8461 (bills), 7477(finances), 7610 (meals).

Notably, 4% of primary caregivers said that they found it very difficult to manage financially, 13% had not been able to keep up with bills and debt repayments in the last six months, 9% had needed to cut the size of their meals or skip meals because they did not have enough money for food at least once since the baby was born, and 12% said they could not afford to buy essential baby items, such as nappies and baby clothes, as often as they would have liked. When combining indicators of significant financial difficulties, 25% of primary caregivers reported at least one of the following four financial difficulties: not keeping up with bills and debts; finding it very difficult to manage financially; having to skip meals; or not being able to afford essential baby items. Seventeen percent reported one of these financial difficulties, 5% reported two, and 2% reported three or four of these difficulties.

In 2021, across the United Kingdom as a whole, 66% of parents reported finding it 'fairly easy', 'easy' or 'very easy' to make ends meet, according to the 2021 Census (ONS, 2021). This is slightly higher than the 59% of COT20s families reporting that they were either 'living comfortably' or 'doing alright' in 2022.

2.5 Summary

The first wave of the Children of the 2020 Study took place in the second half of 2022. At this time, England was adjusting to post-pandemic life and facing rising cost of living pressures. This chapter provided a baseline description of the economic circumstances of families with babies in 2022. In addition to describing the typical circumstances of participating families, these data provide some useful reference points for data users when considering the extent to which the COT20s cohort is nationally representative.

Overall, the results presented in this chapter tend to affirm that the COT20s sample is broadly representative of the England population of families with young babies, when compared against the benchmark of the 2021 Census. The sample also reflects a diverse population of families with babies, for example a notable proportion of babies in single parent families (1 in 5); ethnic diversity reflecting population statistics (around 1 in 4 COT20s babies were of non-White ethnicity); relatively high levels of educational qualifications (nearly 1 in 2 with degree level qualifications) and substantial labour market participation among primary caregivers (around 7 in 10 were in employment or self-employment, of which 4 in 10 were currently working and 3 in 10 on parental leave from their employment). Half of families (50%) were home-owners and around 4 in 10 were renters (42%). There was some evidence of modest under-representation of non-White families in the sample (although this was primarily apparent in relation to the cohort baby's ethnicity rather than the primary caregiver ethnicity) and the study under-represents the highest-income families (those earning more than £100,000 per year), due to its use of the CBR as its sampling frame.

Perhaps reflecting the economic pressures of the current time, a substantial proportion of the population of families with babies appear to experience housing problems and financial strain. Seventeen percent of primary caregivers reported at least one significant problem with their home such as damp, mould or condensation, faulty appliances, heath or ventilation issues, or problems with domestic hygiene, pests or refuse. Around four in ten (43%) reported receipt of at least one of the benefits listed in the survey and one quarter (25%) experienced at least one dimension of financial hardship such as not keeping up with bills and debts; finding it very difficult to manage financially; having to skip or reduce the size of meals due to lack of money; or not being able to afford essential baby items.

3 Child and primary caregiver health and wellbeing

Key findings

- **Cohort child's health:**
  - The majority of cohort children were reported to be in good (19%) or very good (78%) general health at age 9.5 months.
  - Poor health was more prevalent among children in lower income families. 1% of families in the highest family income quintile reported their child to be in either 'fair', 'bad' or 'very bad' health, compared to 5% in the lowest.
  - Most (74%) did not have any serious or longstanding health or developmental condition by age 9.5 months, though 20% had 1 condition and 5% 2 conditions.
  - The most common conditions reported were: allergies and intolerances (9%); problems with skin (8%); breathing (5%); and stomach/digestion (4%).
- **Primary caregivers' health and wellbeing**
  - The majority of primary caregivers reported themselves to be in good (45%) or very good (37%) health.
  - Poor health was more prevalent among primary caregivers from lower income families. 10% of primary caregivers in the highest family income quintile reported their health to be 'fair', 'bad' or 'very bad', compared to 27% primary caregivers in the lowest family income quintile.
  - In total 23% of primary caregivers reported a longstanding physical or mental health condition or illness. For 13% of primary caregivers in total, their condition reduced their ability to carry out day-to-day activities.
  - Nine percent of primary caregivers reported symptoms indicative of current depression and 13% of anxiety, which reflects population estimates.
  - Since the birth of the cohort child, 19% of primary caregivers reported consulting a doctor or other professional for depression or anxiety, and the majority of those who did (86%) received treatment.
  - Depression and anxiety were more prevalent in lower income families. 19% of primary caregivers in the lowest family income quintile scored above the threshold for risk of depression, compared to 3% in the highest family income quintile. For anxiety, the figures were 19% and 8% respectively.
- **COVID-19**
  - Forty-one percent of cohort children had had a confirmed or suspected COVID-19 infection.
  - Just over half of families (57%) reported a COVID-19 infection in either parent that occurred after the baby was born, and three quarters of primary caregivers (74%) had had at least one dose of the COVID-19 vaccination.
  - Fourteen percent of mothers had a suspected or confirmed COVID-19 infection during their pregnancy with the cohort child.

This chapter explores families' health, wellbeing, and experience of COVID-19. Throughout, these health variables are cross-analysed by family income, primary caregiver education, primary caregiver/cohort members ethnicity and family type to explore potential sources of health disparities (see Appendix 1 for full details).

3.1 Background

The health and wellbeing of families with babies is a key focus of the COT20s study. Parental wellbeing, encompassing both physical and mental health, is important in its own right and because extensive evidence indicates that poor parental physical and mental health is associated with a range of less optimal child development outcomes. On the other hand, it should be noted that these associations are complex and parent ill-health is by no means always linked to poor outcomes. Understanding the circumstances under which poor parental health is a greater risk to child outcomes is an important research goal. One key factor in relation to parental depression, for example, is the extent to which the parent experiences sustained symptoms over time, with several studies indicating that poorer child outcomes are primarily observed when parental depression is chronic. Once future waves of data collection have been completed, the longitudinal measurement of parental health and mental health symptoms in the COT20s study will allow us to accurately characterise such patterns and understand the social and economic circumstances linked to these conditions and their distinct and interacting roles in children's outcomes.

A number of factors are likely to make parental mental health in particular a critical policy issue in the coming years. Firstly, there is extensive evidence that poor parental mental health shows socio-economic gradients, and increasing economic pressures on families in the coming years may give rise to the widening of such inequalities (Vukojević et al., 2017). Evidence also shows that the prevalence of mental health difficulties is increasing over time, particularly among young women, and many of the parents in the COT20s study will be in the age cohort that have experienced these rises, which appear to have begun around 2009-2012 (Viola & Moncrieff, 2016). At the same time, mental health services, including services specifically for parents with infants, have been the target of sustained investment in recent years (Population Health, Clinical Audit and Specialist Care Team, 2022). Understanding how mental health and wellbeing is affecting parents and their children and the role that services play in moderating any impacts is an important objective of the COT20s study.

Children's physical health is also important for understanding families' needs and child outcomes (see e.g. Caicedo, 2014; Palisano et al., 2009). Children with chronic illnesses, for example, are more likely to be absent from school and on average have poorer school attainment (Champaloux & Young, 2015). Importantly, although school absences may be a contributory factor, it does not appear to explain the poorer academic outcomes of children with chronic health conditions. Studying children's health from early in life, and

examining its interaction with other potentially contributory circumstances is thus important for addressing the needs of children with chronic illness.

Finally, family health is of particular interest to this study, because it is the first national cohort of babies to be undertaken in the UK since the COVID-19 pandemic. While children are generally less affected by COVID-19 infection than adults (Ludvigsson, 2020), little is known about the effects of COVID-19 infection in babies and young children.

The COT20s study collects a range of data on children's health, including chronic illnesses and hospitalisations. Consent was also requested for data linkage to cohort children's NHS health records. Together, the survey and linked health records will provide crucial information about children's health throughout the life of the study. Similarly, parents were also surveyed about their own health and asked to provide their permission for the study to obtain their NHS health records. For both children and primary caregivers, consent rates for NHS record linkage was high (91% for children, and 89% for primary caregiver).

3.2   Cohort child

3.2.1 Child's Health

3.2.1.1 Current health

Most primary caregivers said their child's health was very good (78%) or good (19%); few reported their child's health as fair (3%), bad (<1%) or very bad (<1%).

Most of the cohort children (74%) did not have any serious or longstanding health or developmental condition at this age; 20% had one condition and 5% two conditions. The most common conditions reported were: allergies and intolerances (9%); skin problems (8%); breathing problems (5%); and stomach and digestions problems (4%). Other conditions were reported for less than 2% of the children.

Fourteen percent of children had been admitted to hospital since they were born because of a serious or longstanding health problem, and 24% had been taken to an Accident and Emergency (A&E) department at a hospital or to a Minor Injuries Unit at least once because they had had an accident or injury. Combined, 20% of children had been to hospital because of either a longstanding condition or an accident/injury.

Regarding the number of A&E visits, 17% of children had been taken once, 5% had been twice, and 3% had been three times or more.

3.2.1.1.1 Demographic differences in child's general health

Although a very high percentage (97%) of the cohort children were reported to be in very good or good health, quality of general health varied according to differing family income, primary caregiver education level, ethnicity and family type, as displayed in Figure 6.

Figure 6. Child's general health by demographic characteristics
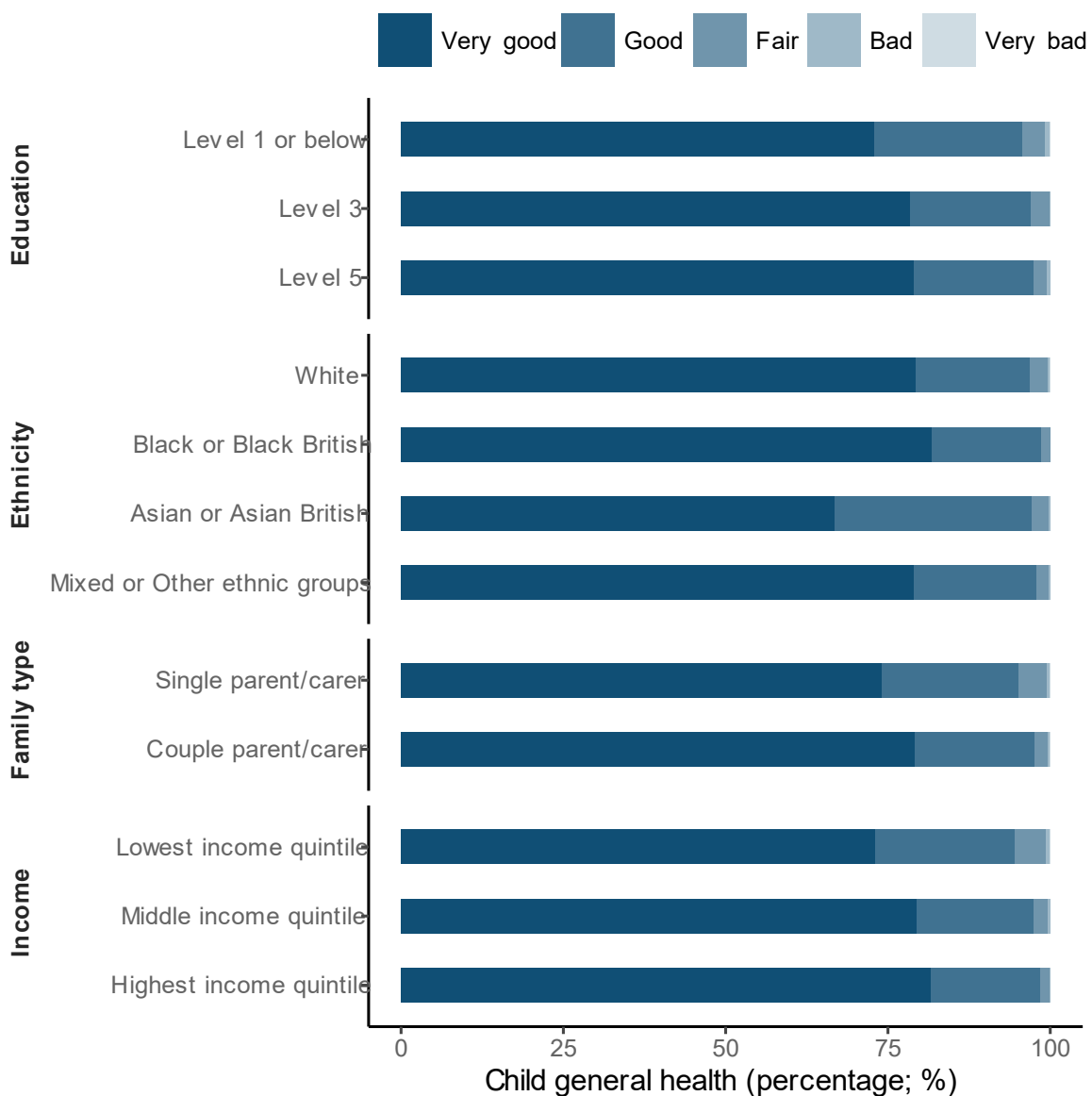
Base: All cohort children. Figure shows column %.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, cohort member ethnicity and family type were independently associated with the child's general health. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographic factors in the analyses. Findings indicate family income, ethnicity and family type were each

associated independently (over and above the association of other demographic characteristics added to the analysis) with the child's general health.

This multivariate analysis indicated that children from higher income families tended to have lower rates of poor health than those from lower income families. To illustrate, 1% of families in the highest family income quintile reported their child to be in either 'fair', 'bad' or 'very bad' health, compared to 5% families in the lowest household quintile.

Analysis also showed that children from coupled parent/carers households tended to have lower rates of poor health than single parent/care households. Of coupled parent/carers, 3% reported their child to be in either 'fair', 'bad' or 'very bad' health, compared to 5% of single parent/carers.

Further, the multivariate analysis showed children of Black or Black British ethnicity tended to have lower rates of poor health than those of White ethnic background, whereas those of Asian or Asian British ethnicity were more likely to be reported in poor health compared to those of White ethnicity. To demonstrate this, 1% of children with Black/Black British ethnic background and 6% of children with Asian or Asian ethnic backgrounds were reported to be in 'fair', ''bad'; or 'very bad' health, compared to the 2% of children of White ethnicity.

3.2.1.2 Gestational Age, Neonatal Care and Birth Weight

Previous evidence consistently indicates that babies born pre-term (birth occurring before 37 weeks of gestation), and with a low birthweight (defined as below 2500 grams [g]) are at heightened risk of facing various health complications, delays in developmental milestones, and potential challenges in educational attainment (Wolf et al., 2002; Goisis et al., 2017) underscoring the importance of exploring differences in these variables in the COT20s sample.

3.2.1.2.1 Gestational Age

Ninety-six percent of births of COT20s children were full term (37 weeks of gestation or above), 4% were preterm (born between 36 and 33 weeks of gestation), <1% were very preterm (born between 32 and 28 weeks of gestation), and <1% were extremely preterm (27 weeks of gestation or less). COT20s demonstrates similar statistics, though with marginally fewer preterm births compared to all births in England in 2021 according to the Census, which found that 92% of children were born full term, 6% were born preterm and less than 1% extremely preterm (ONS, n.d.-a). Gestation length varied across differing family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 7.

Figure 7. Gestation term by demographic characteristics
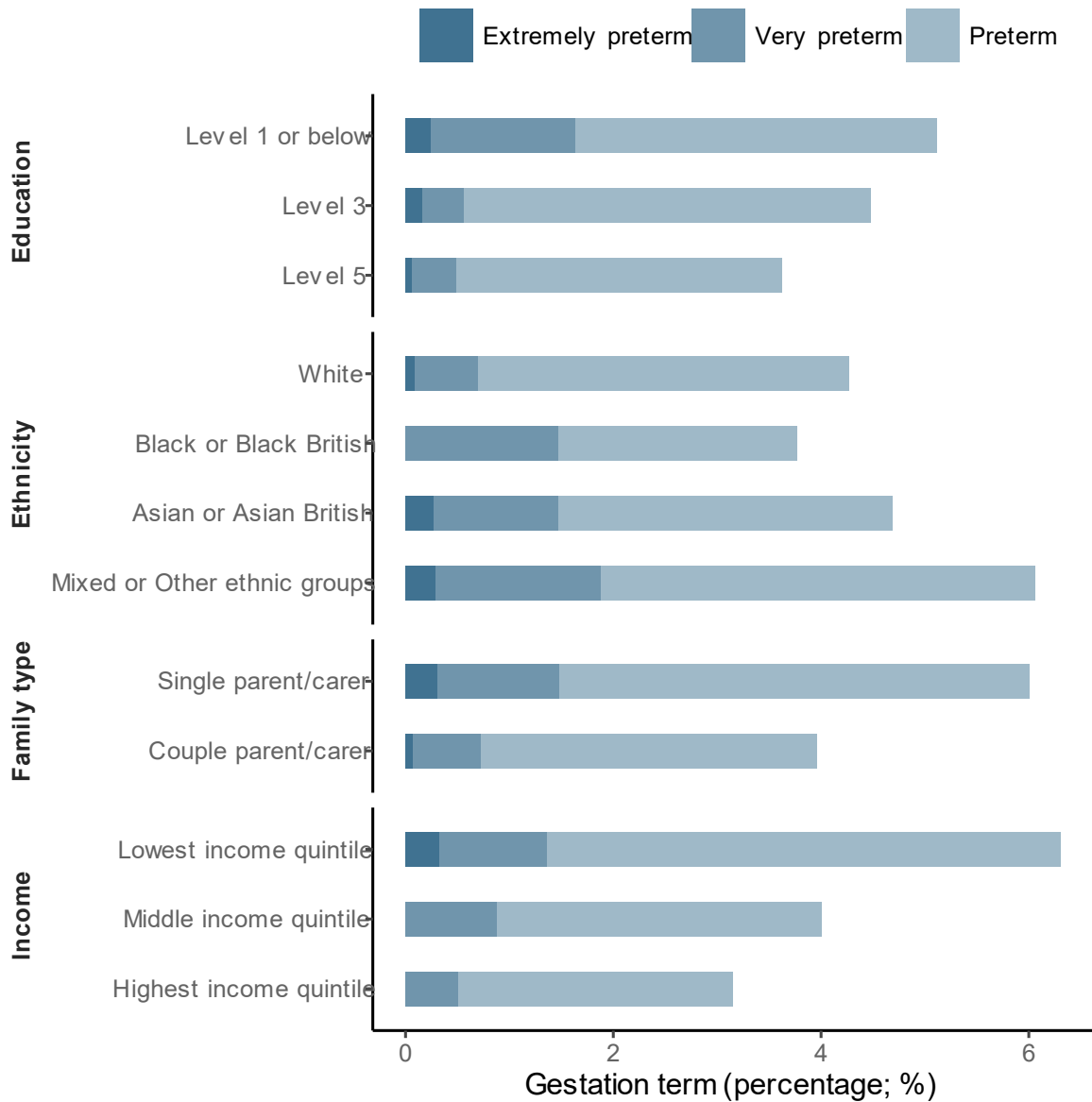
Base: All cohort children.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, primary caregiver ethnicity and family type were independently associated with whether the child was born at full term (37 weeks or above). This analysis tested the independent effect of each demographic characteristic while controlling for the effect of the other demographic characteristics in the analysis. Findings indicate family income was associated independently (over and above the association of other demographic characteristics added to the analysis) with whether the child was born at full term (37 weeks or above).

This multivariate analysis indicated that children from higher income families were less likely to have been preterm (less than 37 weeks) than lower income families. To illustrate

this, of the children from families in the highest family income quintile, 3% were born at less than 37 weeks, compared 6% of those in the lowest income quintile.

3.2.1.2.2 Neonatal Care

Twelve percent of the cohort children had received care in a neonatal unit, such as a Special Care Baby Unit (SCBU) or Neonatal Intensive Care Unit (NICU)[7]. Of those who were cared for in a SCBU or NICU neonatal unit, 27% were born at less than 37 weeks of gestation. Nine percent of children who were born at full term received care in a neonatal unit, compared with 62% of those born preterm, 88% of those born very preterm, and 100% of those born extremely preterm.

3.2.1.2.3 Birth Weight

The average birth weight of the cohort children was 3.32kg (*standard deviation* [SD] = 0.58 kg). Seven percent of children were born with low birth weight (between 2.5kg and 1.5kg), 1% with very low birth weight (between 1.5kg and 1kg) and <1% with extremely low birth weight (less than 1kg). These are consistent ONS figures reporting 6.8% of all babies born in 2021 with birthweights under 2500 grams. Of the children born with a low, very low or extremely low birth weight, 95%, 100% and 100% were not born at full term, respectively. Of those born at term (37 or more gestation weeks) 5% had low birth weight (<2500g), which is slightly higher than the Census 2021 reported figure for England of 2.8% in 2021 (Office for Health Improvement and Disparities, 2023).

3.2.1.2.3.1 Demographic differences in birth weight

Average birthweight varied across differing family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 8.

---

[7] This proportion does not include admittance of a healthy baby because the mother was too unwell to care for the baby in the post-natal ward.

Figure 8. Mean birthweight by demographic characteristics
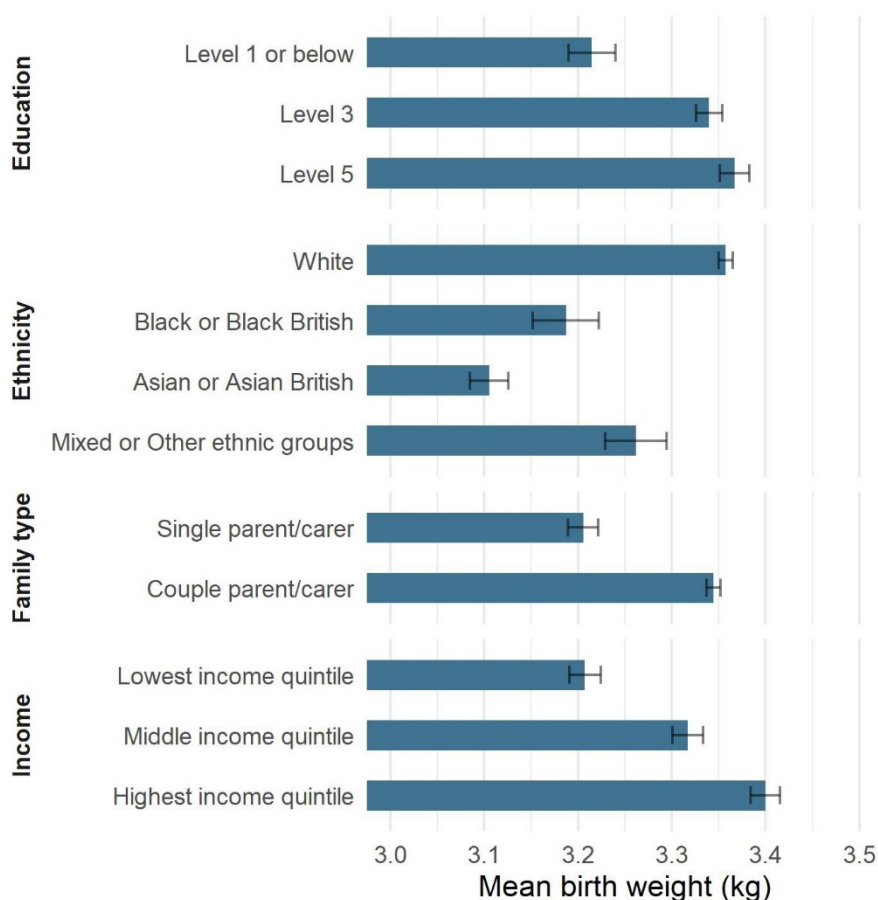
Base: All cohort children. Figure shows means and bars denote standard error. Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the child's birth weight. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicated that family income, family type and primary caregiver ethnicity associated independently (over and above the association of other demographic characteristics added to the analysis) with the child's birth weight.

This multivariate analysis indicated that children from higher income families tended to weigh more at birth compared to those from lower income families. On average, children from families in the highest family income quintile weighed 190g more than children in the lowest family income quintile.

The analysis also indicated that children from coupled parent/carer households tended to weigh more at birth than single parent/carer households, with children from coupled parent/carer households weighing on average 140g more than those from single parent/carer households.

Additionally, the multivariate analysis showed that children with a primary caregiver of Black or Black British or Asian or Asian British ethnicity tended on average to weigh less than children with a primary caregiver of White ethnicity. Oon average, children with a primary caregiver of Black or Black British ethnicity weighed 170g less, and those of Asian or Asian British ethnicity 252g less, than children with a primary caregiver of White ethnicity.

3.3 Primary caregiver

3.3.1 Health

3.3.1.1 General health

Most primary caregivers said their health was very good (37%) or good (45%), while 15% reported fair, 3% reported bad, and <1% reported very bad health. A total of 23% of the primary caregivers reported a physical or mental health condition or illness lasting or expected to last 12 months or more. For 13% of primary caregivers, having a physical or mental health condition reduced their ability to carry out day-to-day activities. The health of the caregivers in the COT20s study is broadly comparable to the population in England in 2021 (adjusted for age) according to Census of England, where 48% reported to be in very good health, 34% in good health, 13% in fair health and respectively 4% and 1% to be in bad and very bad health (ONS, n.d.-f). A somewhat smaller proportion of COT20s primary caregivers reported their health to be very good than the census, but the proportion reporting either very good or good health was the same (82% in both cases).

3.3.1.1.1 Demographic differences in primary caregiver general health

Primary caregiver health varied across differing family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 9.

Figure 9. Primary caregivers' general health by demographic characteristics
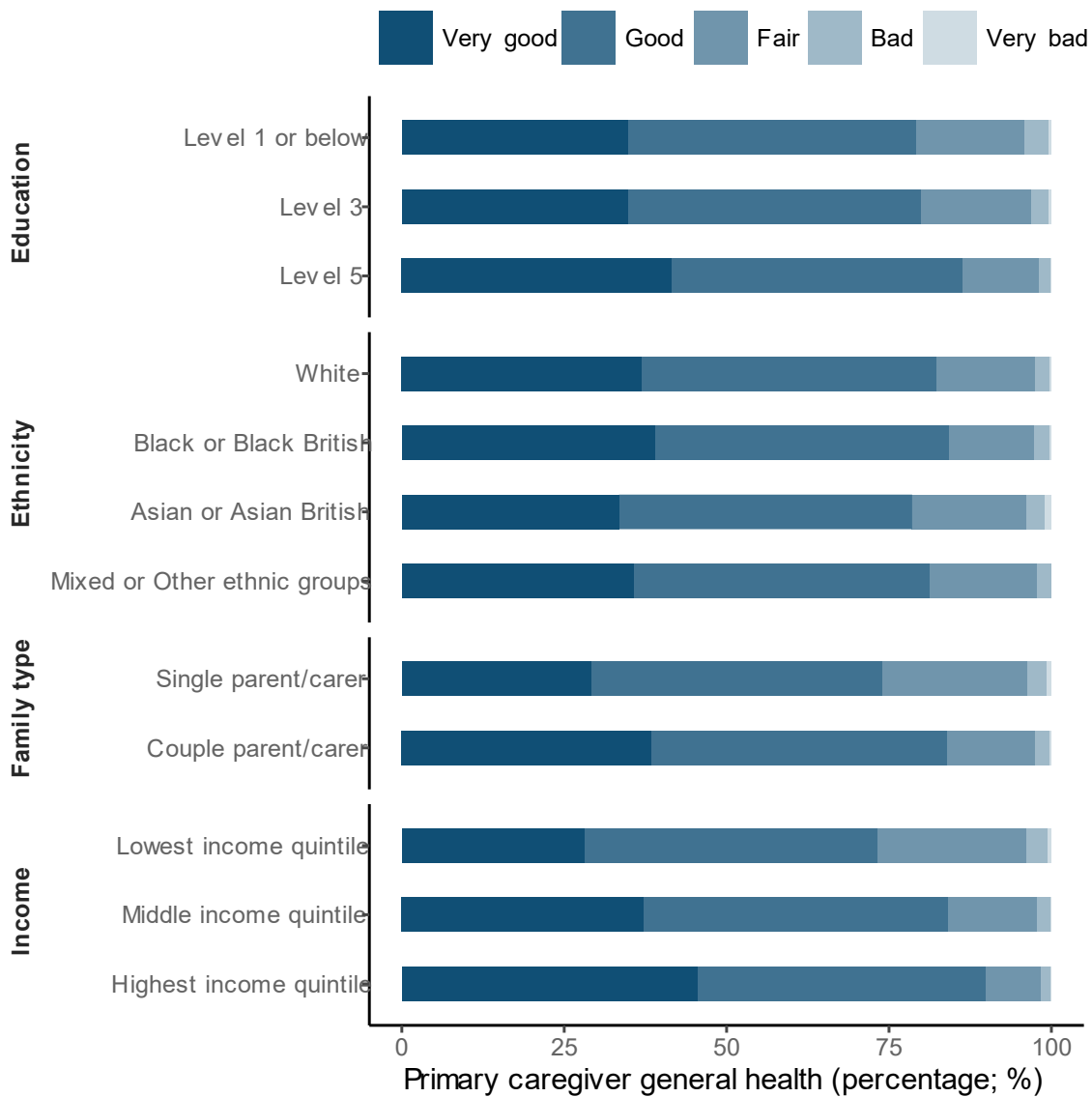
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the primary caregivers' general health. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver ethnicity and family type were each associated independently (over and above the association of other demographic characteristics added to the analysis) with the quality of the primary caregivers' general health.

This multivariate analysis indicated that primary caregivers from higher income families reported lower rates of poor primary caregiver general health than those from lower income families. Demonstrating this, 10% of primary caregivers in the highest family

income quintile reported their health to be 'fair', 'bad' or 'very bad', compared to 27% primary caregivers in the lowest family income quintile.

Multivariate analysis also indicated that couple parent/carer households reported lower rates of poor primary caregiver general health than single parent/carer households. Illustrating this, 16% of coupled parents/carers reported their health to be 'fair', 'bad' or 'very bad', compared to 26% of single parents/carers.

Additionally, the multivariate analysis indicated primary caregivers of Asian or Asian British ethnicity reported higher rates of poor health than primary caregiver of White ethnicity, whereas those of Black or Black British reported lower rates of poor health than primary caregivers of White ethnicity. However, the size of this effect was small, as highlighted by the differences in the percentages of those of different ethnicities reporting 'fair', 'bad' or 'very bad' health; 21% of primary caregivers with an Asian/Asian British ethnicity and 16% of primary caregivers of Black/Black British ethnicity were in 'fair', 'bad' or 'very bad' health, compared to the 18% of primary caregivers of White ethnicity.

3.3.2 Mental health and wellbeing

3.3.2.1 Depression and Anxiety

The survey included self-completion questions designed to screen for depression and anxiety symptoms in the previous two weeks. These were the Patient Health Questionnaire-2 (PHQ; Kroenke et al., 2003) to screen for the risk of depression, and the Generalized Anxiety Disorder 2-item (GAD; Kroenke et al., 2007) questionnaire to screen for risk of anxiety. When drawing conclusion from these findings it is important to consider that individuals with poor psychological health, regardless of their background, are less likely to participate in surveys (Momen et al., 2022) and therefore the following figures may be underestimates of the true prevalence of anxiety and depression in the population.

Nine percent of primary caregivers reported scores on the PHQ indicative of depression, and 13% reported scores indicative of generalized anxiety disorder on the GAD. The National Maternity Survey (NMS) for England estimated the prevalence of depression among women with 6-month-old infants of 10.3% in 2014, 16% in 2018 and 23.9% in 2020 during the pandemic (Fellmeth et al., 2022). Although the lower prevalence rate for depression measured in 2022 in COT20s could be taken to indicate a reduction from a peak level observed during the pandemic, any direct comparison is imprecise due to differences in the instruments used, the age of the babies, and the sampling and response rate of the NMS (Harrisson et al., 2023). The estimated prevalence of postnatal anxiety in the 2020 Maternity Survey, also using the GAD-2, was 15% when infants were 6 months (Fellmeth et al., 2022), which is similar to the rate among COT20s primary caregivers. Since the birth of the cohort child, 19% of primary caregivers reported

consulting a doctor or other professional for depression or anxiety, and the majority of those who did (86%) received treatment.

3.3.2.1.1 Demographic differences in primary caregiver depression

The percentage of primary caregivers scoring above the threshold for risk of depression on the PHQ scale varied across differing family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 10.

Figure 10. Primary caregivers' PHQ threshold by demographic characteristics
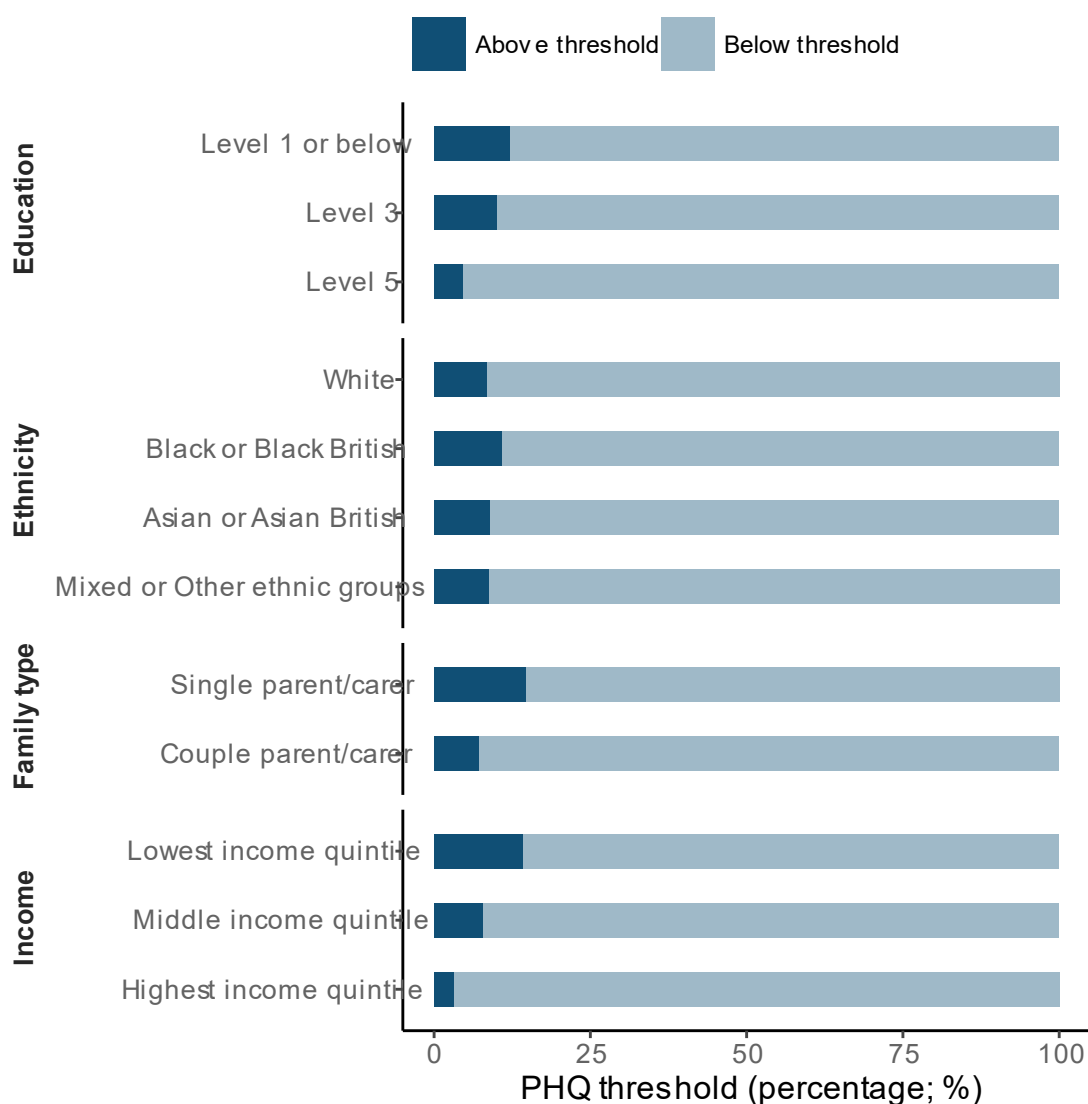
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the primary caregiver levels of depression (according to scores on the PHQ). This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver education and family type were each associated independently (over and

above the association of other demographic characteristics added to the analysis) with primary caregiver levels of depression.

This multivariate analysis indicated that primary caregivers from lower income households had higher rates of depression compared to those from higher income households. Demonstrating this, 3% of primary caregivers in the highest family income quintile scored above the threshold for risk of depression, compared to 19% of primary caregivers in the lowest family income quintile.

Multivariate analysis also showed that primary caregivers with lower education levels reported higher rates of depression compared to those with higher education levels, as highlighted by the 5% of those with the highest level of education scoring above threshold, compared to 12% with the lowest education level.

Additionally, the multivariate analysis indicated that single parents/carers reported higher rates of depression on average than those who were coupled parent/carers. Illustrating this, 7% of coupled parents/carers scored above the threshold, compared to 15% of single parents/carers.

3.3.2.1.2 Demographic differences in primary caregiver anxiety

The percentage of primary caregivers scoring above the threshold for risk of anxiety on the GAD scale varied by family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 11.

Figure 11. Primary caregivers' GAD threshold by demographic characteristics
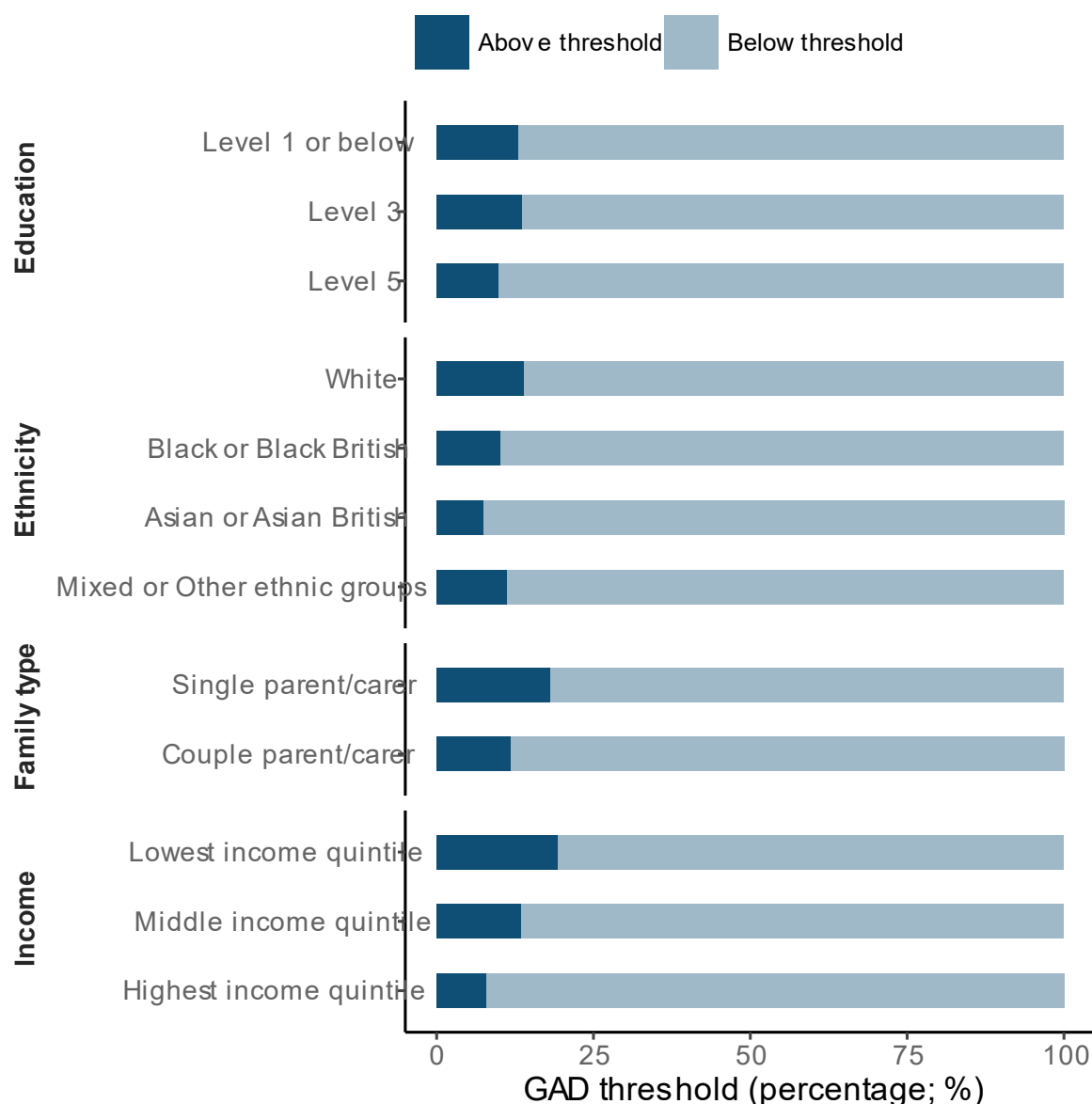
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with primary caregiver levels of anxiety (according to scores on the GAD). This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income and primary caregiver ethnicity were each associated independently (over and above the association of other demographic characteristics added to the analysis) with primary caregiver levels of anxiety.

This multivariate analysis indicated that primary caregivers from lower income families were more likely to score highly for anxiety, with 19% of primary caregivers in the lowest

family income quintile scoring above the threshold for risk of anxiety, compared to 8% of primary caregivers in the highest family income quintile.

Additionally, the multivariate analysis showed that primary caregivers of Black or Black British or Asian or Asian British ethnicity were less likely to score above the threshold for risk of anxiety when compared to primary caregivers of White ethnicity. To demonstrate this, 10% primary caregivers of Black/Black British ethnicity and 7% of primary caregivers of Asian/Asian British ethnicity scored above the threshold, compared to the 14% of primary caregiver of White ethnicity.

3.3.2.2 Parenting Stress

Primary caregivers were asked a set of questions on their levels of stress specifically related to the experience of being a parent or carer of the cohort child, with higher scores indicating higher levels of parental stress. The items of the Parental Stress Scale (Berry & Jones, 1995) included questions related to stressors experienced by parents, such as demands on resources (time, energy, and finances), managing responsibilities, and worrying about doing enough for their child. Evidence suggests that higher levels of parental stress can be associated with behavioural as well as developmental difficulties in children (Louie et al., 2017).

3.3.2.2.1 Demographic differences in primary caregiver parenting stress

The mean levels of parenting stress reported by primary caregivers varied by family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 12.

Figure 12. Mean parenting stress score by demographic characteristics [8]
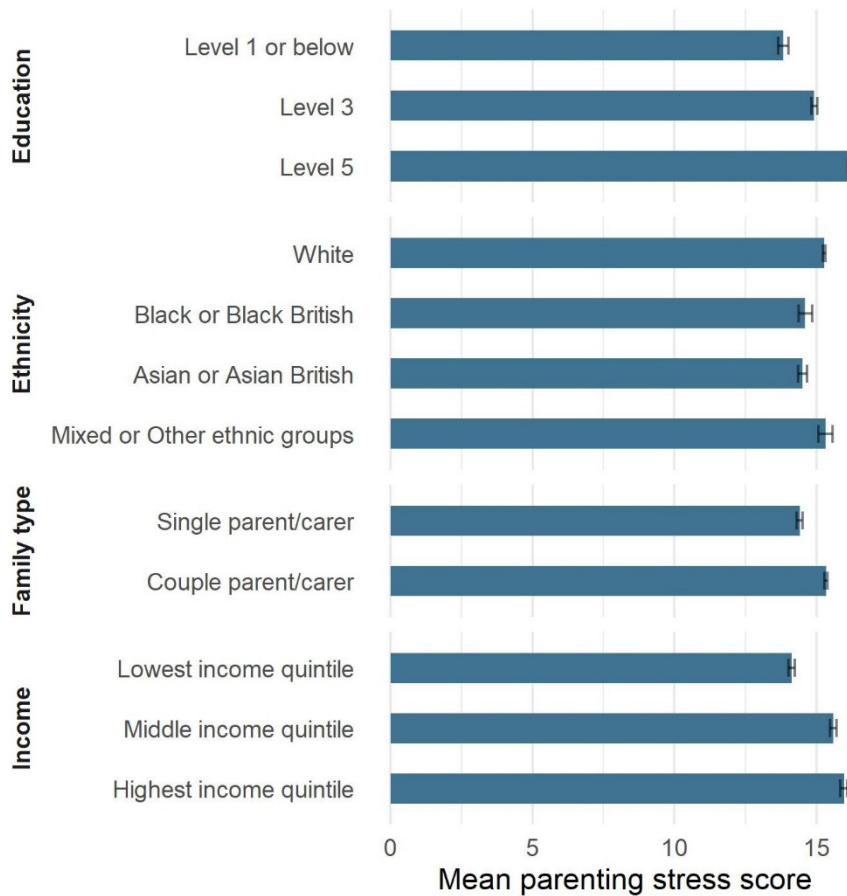
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the child's general health. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver education and ethnicity were each associated independently (over and above the association of other demographic characteristics added to the analysis) with parenting stress levels.

This multivariate analysis indicated that primary caregivers from higher income families were more likely to report high levels of parenting stress than those of lower income families. To illustrate this the mean parenting stress score of primary caregivers in the highest family income quintile was 15.96, compared to 14.12 for those primary caregivers in the lowest family income quintile.

---

[8] Responses to the 6 the parenting stress questions were combined to create a single parenting stress score. Scores ranged between 6 and 29, with a mean parenting stress score across the primary caregivers at 15.2 (SD = 4.3).

The multivariate analysis also indicated that those with a higher level of education were more likely to report high levels of parenting stress, as indicated by the mean parenting score of 16.20 for primary caregivers with the highest level of education, compared to 13.81 for those with the lowest level of education.

Additionally, the multivariate analysis showed primary caregivers of Asian or Asian British ethnicity were likely to report lower levels of parenting stress compared to primary caregiver of White ethnicity, as highlighted by the mean parenting stress score of 14.49 for primary caregivers of Asian or Asian British ethnicity who reported the highest level of parenting stress, compared to the 15.27 for primary caregivers of White ethnicity.

3.3.2.3 Loneliness and isolation

Twenty-three percent of primary caregivers said they never feel lonely, indicating that conversely 77% of primary caregivers experience some degree of loneliness, with 5% reporting they feel lonely often or always. These figures are comparable to those reported by the ONS in the UK Opinion and Lifestyle Survey (May-June 2022), where 7% of respondents stated that they often/always felt lonely and 20% stated they never felt lonely. Four percent of primary caregivers also reported feeling isolated from others often or always and 32% reported never feeling isolated from others. Figure 13 displays the percentage of the primary caregivers experiencing differing levels of isolation and loneliness.

Figure 13. Primary caregivers' frequency of feeling lonely or isolated
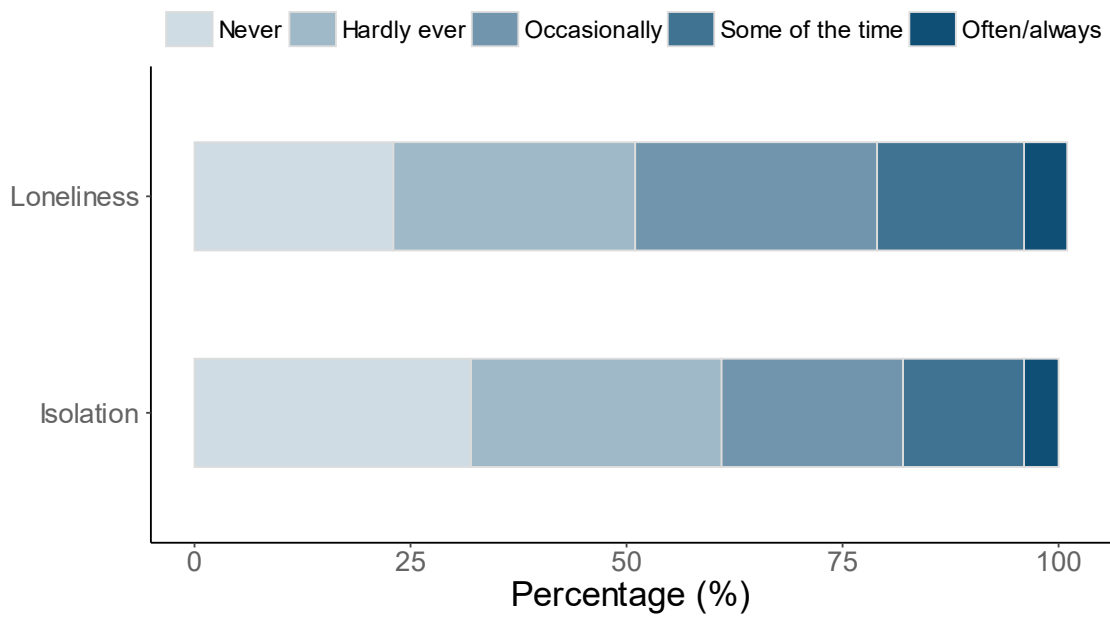
Base: All primary caregivers.   Source: COT20s wave 1

3.3.2.2.1 Demographic differences in primary caregiver loneliness

The degree to which primary caregivers experience loneliness varied by family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 14.

Figure 14. Primary caregiver loneliness by demographic characteristics
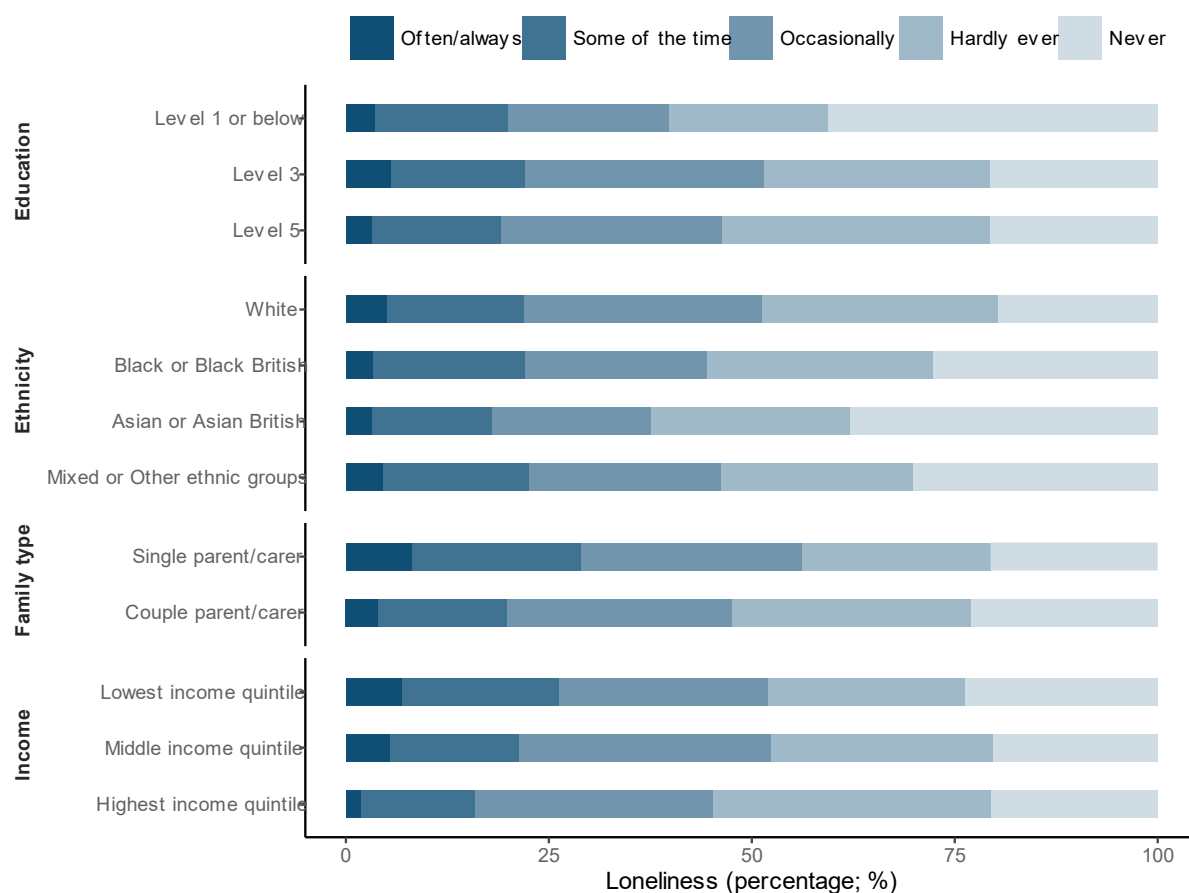
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the degree to which primary caregivers reported experiencing loneliness. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate each demographic characteristic associated independently (over and above the association of other demographic characteristics added to the analysis) with primary caregivers reported experience of loneliness.

This multivariate analysis indicated that primary caregivers from lower income families were more likely to experience loneliness compared to those who were from higher income families. To illustrate, this, 2% of those in the highest income quintile reported often/always feeling lonely compared to 7% of those who were from the lowest income quintile.

The multivariate analysis also demonstrated that primary caregivers with a higher level of education were more likely to experience loneliness compared to those with a lower education level. This is illustrated by the 41% those of those in the lowest education level

quintile who reported never feeling lonely compared to 21% in the highest education level quintile.

The multivariate analysis also showed that single parents/carers were more likely to experience feeling lonely compared to caregivers from a parent/carer couple, as indicated by the 8% of single parents/carers reporting that they often/always feel lonely, compared to 4% of single to couple parents/carers.

Additionally, the analysis indicated that primary caregivers of Black or Black British ethnicity, of Asian or Asian British or of Mixed/Other ethnicity were less likely to report feeling lonely compared to those of White ethnicity. Of primary caregivers of Black or Black British ethnicity, and of Asian or Asian British ethnicity, 4%, and 3%, respectively, reported lonely often/always feeling lonely, compared to 5% of primary caregivers of White ethnicity.

3.4   COVID-19

The COT20s study is the first nationally representative birth cohort study in England since the COVID-19 pandemic. The COVID-19 pandemic has had a profound impact on societies worldwide, causing widespread disruptions and altering daily routines. Children included in this study were born between September and November 2021 and, during pregnancy and the postnatal period, will likely have experienced a unique set of circumstances, marked by a highly contagious virus, some remaining social distancing measures, the roll out of the new vaccine programme, and significant changes to healthcare systems. Specifically, the gradual lifting of nation-wide lockdowns, including the reopening of non-essential businesses, softening of social distancing measures and the availability of effective COVID-19 vaccines occurred during the gestation of the children in the COT20s study (Institute for Government Analysis, 2022). Further, between their birth and the time of the survey, England experienced a series of new COVID-19 variant outbreaks, vaccine boosters were offered to all UK adults and the nation gradually eased into the "Living with COVID" strategy, whereby government guidelines encouraged a gradual return to a pre-pandemic way of life (Sherrington, 2022).

The COT20s study provides a unique resource for understanding the direct and indirect impacts of the later stages of the pandemic on children's lives. In the Wave 1 survey, primary caregivers were asked to report whether they, their partner or the cohort baby had been infected with COVID-19 (note that fieldwork took place between June and November 2022 when the cohort children were age 9.5 months on average). They were also asked about long-COVID symptoms and vaccination.

3.4.1 COVID-19 infection in cohort child

Forty-one percent of the cohort babies had had a confirmed or suspected COVID-19 infection. This was based on a positive test (as reported by 23% of primary caregivers),

or on **either** strong personal suspicion or medical advice (as reported by 17% of primary caregivers). Eleven percent reported they were unsure if their child had ever had COVID-19, and 48% reported their child had not had a COVID-19 infection.

3.4.1.1 Demographic differences in child COVID-19 infections

The rate of COVID-19 infection in cohort varied across differing family income, primary caregiver education level, primary caregiver ethnicity and family type, as displayed in Figure 15.

Figure 15. Cohort child COVID-19 infection by demographic characteristics
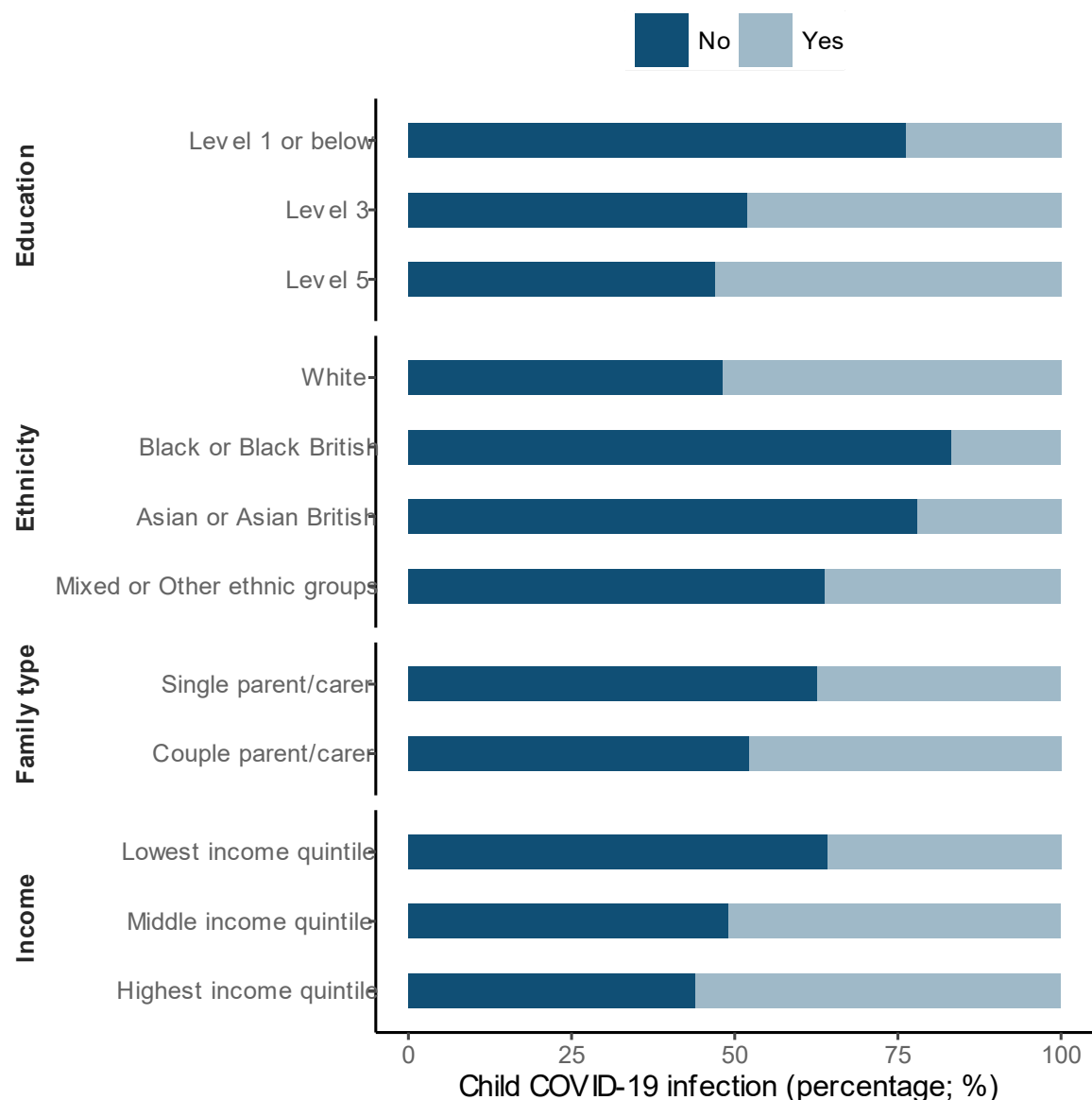
Base: All cohort children.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the

likelihood of the cohort child having been infected with COVID-19 [9] at any time since their birth. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver education and ethnicity were each associated independently (over and above the association of other demographic characteristics added to the analysis) with the likelihood of the cohort child having been infected with COVID-19.

This multivariate analysis indicated that children from higher income families were more likely than children from lower income families to have been infected with COVID-19. To illustrate this, of primary caregivers in the highest family income quintile, 56% reported their child to have been infected with COVID-19 since birth, compared to 36% in the lowest quintile of family income. Further analyses to explore the factors giving rise to higher rates of reported infection in babies in higher income households could examine different patterns of social contact, such as the higher proportion of higher income families using childcare at the time of the survey, as reported in section 5.

The multivariate analysis also indicated that children with more highly educated primary caregivers were more likely to have been infected with COVID-19 compared to those of lower primary caregivers with lower levels of education. Of primary caregivers in the highest education level, 53% reported their child to have been infected with COVID-19 since birth, compared to 24% in the lowest education level.

Further, the multivariate analysis showed that children with a primary caregiver of Black or Black British ethnicity, of Asian or Asian British ethnicity or of Mixed/Other ethnicity were less likely to have been infected with COVID-19 since their birth, compared to children with primary caregivers of White ethnicity. This is illustrated by the finding that 17% of children which with a primary caregiver of Black or Black British ethnicity, 22% with a primary caregiver of Asian or Asian British ethnicity and 36% with a primary caregiver of Mixed/Other ethnicity, had been infected with COVID-19, compared to 52% of children with a primary caregivers of White ethnicity.

3.4.2 COVID-19 infection in parent/carers

Regarding the COVID-19 infection rate among primary caregivers, 62% reported that at some point before their chid was age 9.5 months they themselves had been infected with COVID-19 as confirmed by a positive test, and an additional 4% reported to have been infected with COVID-19 based on a strong personal suspicion or medical advice.

A total of 47% of primary caregivers reported they had COVID-19 since the cohort baby was born. When combining the infection of the primary caregiver with that of their

---

[9] The response options "Yes, confirmed by a positive test" and "Yes, based on strong personal suspicion or medical advice" have been combined into one response category indicating COVID-19 infection.

partner, 57% of families reported a COVID-19 infection in either parent after the baby was born.

Fourteen percent of mothers (either the respondent or their partner) had a suspected or confirmed COVID-19 infection during their pregnancy with the cohort baby; 4% during the first trimester, 4% during their second trimester and 6% during the third trimester.

Ten percent of primary caregivers reported that they had or had had long-COVID, defined as a condition that develops during or following a COVID-19 infection and continues for more than 12 weeks, with wide-ranging and fluctuating symptoms such as breathlessness, chronic fatigue, "brain fog", anxiety and stress.

3.4.3 COVID-19 vaccinations in parents/carers

In England, the NHS COVID vaccination programme began on December 8, 2020, and had been running for almost 2 years at the time of the interviews (which took place between June and November 2022). It was a nationwide effort to vaccinate the population against COVID-19, starting with priority groups, such as healthcare workers, elderly individuals, and those with underlying health conditions, and then opened up to the wider population, staggered by age groups. The vaccines that were made available through the NHS COVID vaccination programme include the Pfizer-BioNTech, Oxford-AstraZeneca and Moderna, all of which required two doses to be fully vaccinated against COVID-19.

When primary caregivers were asked whether they had been vaccinated, 74% said they had received at least their first COVID vaccination: 40% were fully vaccinated with a booster shot, 26% were fully vaccinated without a booster shot, and 8% were partially vaccinated (had received one of the two doses required for full vaccination).

When asked if they had any doses of the vaccine during pregnancy, 37% of mothers (either the respondent or their partner) had, 38% had had it before/after pregnancy, while 25% were not vaccinated.

3.5   Summary

This chapter examined families' health, wellbeing and COVID-19 experience and also explored differences by key social and economic factors.

The majority of cohort children were in very good (78%) or good (19%) health, although 1 in 4 children have a longstanding health or developmental condition. Birth statistics (birth weight and gestation length) were similar to population data, suggesting that the COT20s is representative with respect to such factors. Considering the primary caregivers' health, 82% reported their health to be either very good or good, with 23% having a long term physical or mental health condition. Anxiety or depression were present in 13% and 9%

of primary caregivers, respectively, and 5% of primary caregivers reported to feel lonely often/always, with 23% never feeling lonely.

Socio-economic disparities were evident in both the children's and the primary caregivers' health and wellbeing. Children from higher income families tended to be reported as being in better health, had higher birth weights on average and were more likely to have been born at full term (37 weeks or more). Being from a single parent/carer household was associated with higher rates of poor health, and lower birth weight. Children who had a primary caregiver of Asian or Asian British ethnicity were more likely to be reported in poor health compared to those of White ethnicity. Conversely, children of Black or Black British primary caregivers were less likely to be reported to be in poor health than those of White ethnicity.

Caregivers' health followed similar trends, with higher income and coupled households reporting, on average, higher rates of good health. Both depression and anxiety were both were more common in primary caregivers of lower income. Loneliness was reported less frequently among higher income families, but was reported more frequently by primary caregivers who were of White ethnicity compared to those of other ethnic groups.

The COT20s study is the first post-COVID-19 pandemic birth cohort study in England. Just over half the families (57%) had experienced a COVID-19 infection since the child was born, and 2 in 5 children had had a confirmed or suspected infection. Higher rates of COVID-19 infection were reported in children from families with higher income, with primary caregivers with higher education levels and with primary caregivers of White ethnicity. A significant proportion (14%) of mothers reported a confirmed or suspected COVID-19 infection during their pregnancy.

Taken together, these findings indicate that demographic differences in child and parental physical and mental health and wellbeing are evident at this early age. Tracking the longer-term effects of this variation is an important objective of the COT20s study to identify areas for potential intervention and policy development aimed at enhancing children's outcomes.

4 The home learning environment and early child development

Key findings

- At age 9.5 months at least 80% of primary caregivers reported cuddling their child, playing with toys together and talking to their child several times a day, while more than half engaged in physical play, turn-taking play, singing to their child, pretend games and noisy play. Around three quarters showed their child picture books or took their child outside at least once a day.
- There was variation in reported home learning activities by family demographic characteristics. Specifically, families with the lowest incomes, those with lower education levels and those of Black or Black British ethnicity, and of Asian or Asian British ethnicity had lower average home learning combined scores, compared to families with the highest incomes, highest education levels and White ethnicity respectively. These differences were all small in magnitude.
- At age 9.5 months the cohort children typically watched 29 minutes of digital content a day on average. There was substantial variation, as 28% did not typically watch any television, videos or other digital content on a screen while 7% did so for more than 2 hours a day. Children who watched screens (72%) typically did so for an average of 41 minutes a day.
- The amount time spent watching screens varied by demographic characteristics. Children from families with the lowest incomes, lowest education levels, single parent/carer households and children with a primary caregiver of Black or Black British ethnicity tended to watch screens for longer on average (36, 32, 39 and 49 minutes respectively), than children from families with the highest incomes, highest education levels, in coupled households or with a primary caregiver of White ethnicity (22, 20, 27 and 28 minutes respectively).
- Language comprehension development was not significantly different from pre-pandemic norms, with babies understanding an average of 14 words out of a list of 51 common words at age 9.5 months.
  - o Home learning activities were associated with language comprehension development: children who were engaged in turn-taking play several times a day understood 5 more words on average than those who were never engaged in this activity; those who were read to several times a day understood 4 more words on average, and those who were engaged in physical play understood 3 more words on average, than those who were never engaged in the respective activities.
  - o Children who experienced a lower frequency and variety of home learning activities on average understood fewer words.
  - o There was no relationship between time spent watching digital content on a screen and the number of words understood at age 9.5 months.

This chapter explores the cohort children's home learning environment and cross-analyses these by family income, primary caregiver education, primary caregiver ethnicity and family type to explore potential sources of disparities (see Appendix 1 for full details). Further this chapter explored early language development and association with the home environment (see Appendix 2 for full details). Where appropriate, findings are compared to population statistics or reference/normative data.

4.1 Background

Extensive evidence demonstrates that the home environment, such as engagement in caregiver-child learning and play activities, play a crucial role in a child's overall development from an early age (Melhuish et al., 2010). Engaging in enriching learning activities with young children (such as signing, speaking, reading and playing age-appropriate games) provides valuable opportunities for language acquisition, motor skill development, critical thinking, and problem-solving skills (Sylva et al., 2004). Further, a growing body of evidence indicates that regularly exposing infants to green and natural spaces may also be important for their early development (Dadvand et al., 2019). Even in the earliest stages of life, exposure to green and natural spaces may aid sensory, motor, and cognitive development (Islam et al., 2020). Stimulating language interactions, playing with age-appropriate toys and games and exposure to a variety of environments are thought to contribute to positive child development across the cognitive, social, and emotional domains (Jimenez et al., 2022). COT20s provides detailed evidence on the home environment and interactions during infancy, which will be beneficial in future waves of the study for analysing how these early experiences influence children's later learning and development outcomes.

4.2 Home learning environment

4.2.1 Home learning activities and interactions

The survey listed 11 different home learning activities and interactions, and asked primary caregivers how frequently they did each with their child. More than 75% of primary caregivers reported doing each of the activities or interactions at least several times a week. At least 80% reported cuddling, playing with toys and talking to their child several times a day; more than half engaged in physical play, turn-taking play, singing to child, pretend games and noisy play several times a day. Around three quarters of primary caregivers showed their child picture books or took their child outside at least once a day. The least frequent of the listed activities carried out by primary caregivers at age 9.5 months was reading to the child. Figure 16 displays the frequency with which primary caregivers engaged in of the listed home learning activities with the cohort child.

Figure 16. Engagement in home learning activities and interactions[10] with cohort child

Legend:
- Several times a day
- Once or twice a day
- Several times a week
- Once or twice a week
- Less than once a week
- Never

Categories (top to bottom):
- Cuddle child
- Play with toys
- Talk to child
- Physical play
- Turn-taking play
- Sing to child
- Pretend games
- Noisy play
- Show picture books
- Go outside
- Read to child

X-axis: Percentage (%)
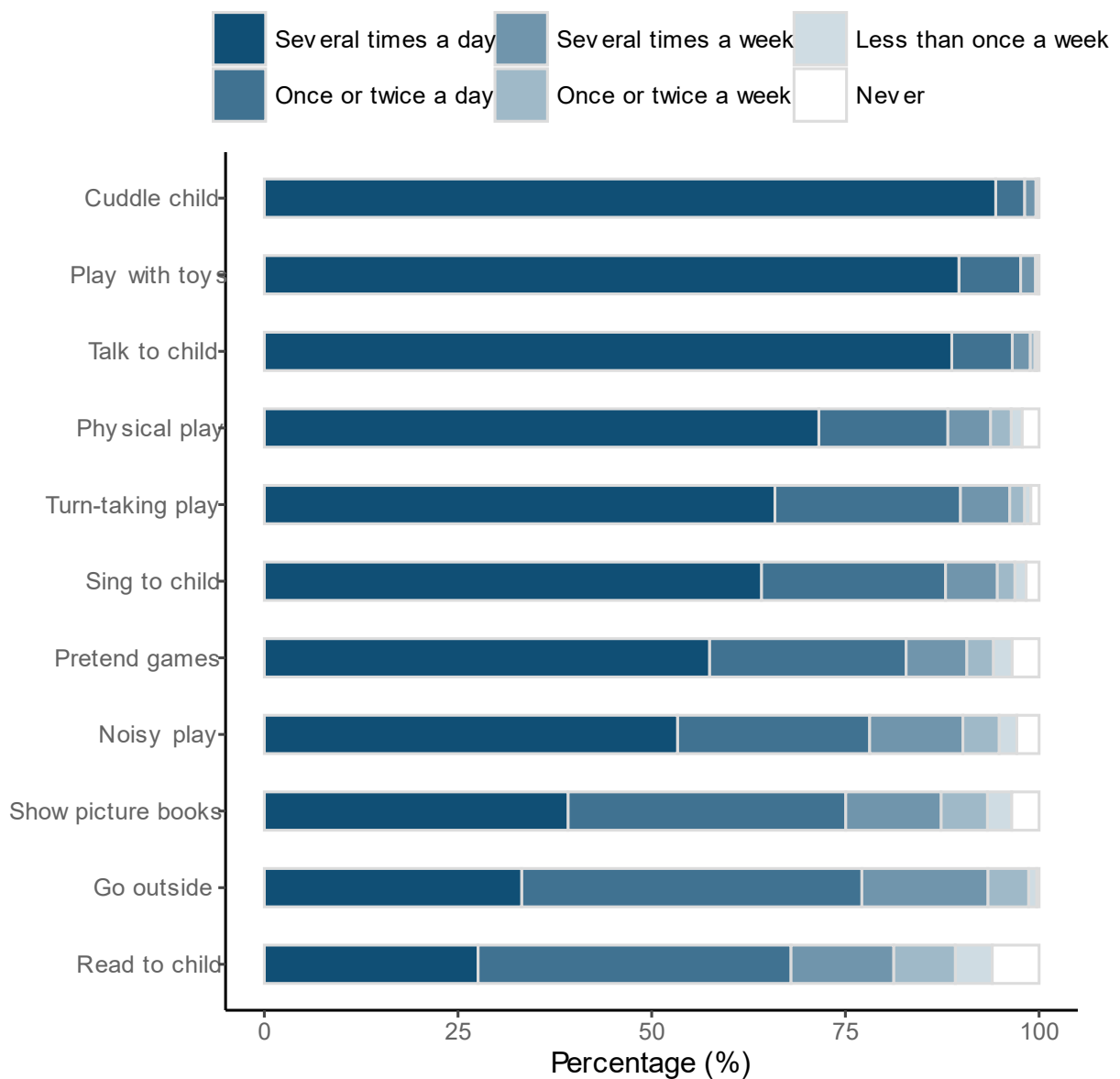
Base: All primary caregivers.   Source: COT20s wave 1

4.2.1.1 Demographic differences in home learning activities

To explore social and demographic disparities in the amount home-learning activities and interactions, a combined home learning score was calculated by summing frequencies with which parents reported doing each of the home learning activities[11]. Higher combined home learning scores indicate a higher frequency and variety of home learning

---

[10] Turn-taking refers to play without toys/other objects—for example, peek-a-boo, pat-a-cake, 'where's baby's eyes?', 'I spy'.

[11] Frequency response options were first transformed into numeric scores ("Never" = 1, "Several times a day" = 6) and then summed across all 11 activities and interactions. The sample mean of combined home learning score was 58.98 (SD=5.81), scores ranged from 21 to 66.

activities. Figure 17 shows that the mean combined home learning environment score varied by family income, primary caregiver education, ethnicity, and family type.

Figure 17. Mean home learning combined score [12] by primary caregiver education, ethnicity, income and family type
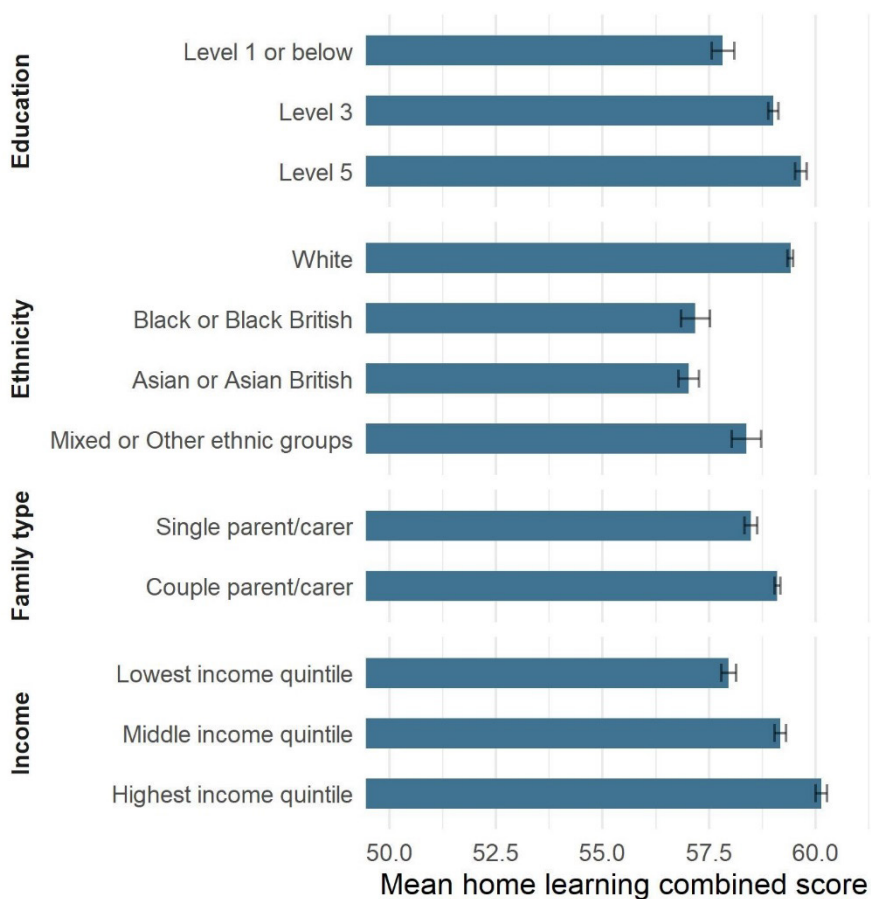
Base: All primary caregivers.   Source: COT20s wave 1

Note. Although the home learning combined score ranged from 21 to 66, the x-axis is focused on the upper end of the scale (50 to 61) to clearly display the differences by demographics for the reader.

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the combine home learning score. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver education and ethnicity were

---

[12] Frequency response options were first transformed into numeric scores ("Never" = 1, "Several times a day" = 6) and then summed across all 11 activities and interactions. The sample mean of combined home learning score was 59 (SD=5.81), scores ranged from 21 to 66.

each associated independently (over and above the association of other demographic characteristics added to the analysis) with the combined home learning score[13].

This multivariate analysis indicated that primary caregivers from higher income families reported more frequent and varied home learning activities and interactions (according to the combine home learning score) compared to those from lower income families. To illustrate the size of these differences, the mean home learning combined score of children in the lowest income families was 57.96, compared the mean combined home learning score of 60.13 for those in the highest income families.

Additionally, the analysis indicated that primary caregivers with a higher education level reported more frequent and varied home learning activities and interactions (according to the combine home learning score) compared to those with lower education levels. This is demonstrated by the mean home learning combined score of children with primary caregivers in the lowest educated level being at 57.82, compared to 59.65 for those with primary caregivers with the highest education level.

Further, the multivariate analysis demonstrated children with primary caregivers of Black or Black British ethnicity or of Asian or Asian British ethnicity reported fewer or less frequent home learning activities and interactions (according to the combine home learning score) compared to children with primary caregivers of White ethnicity. This is highlighted by the finding that children with primary caregivers of Black or Black British ethnicity had a mean combined home learning score of 57.17, and children with a primary caregiver of Asian or Asian British ethnicity had a mean combined home learning score of 57.02, compared to the mean combined home learning score of 59.40 for those with a primary caregiver of White ethnicity.

4.2.2 Screen use

Twenty eight percent of the cohort children did not typically watch any television, videos or other digital content on a screen at age 9.5 months, whereas 7% did so for more than 2 hours a day. Seventy-two percent watched some television, videos or other digital content on a screen each day. Overall, the children watched digital content on a screen for an average or 29 minutes a day. Of those that did watch digital content at all, the average viewing time per day was 41 minutes.

---

[13] Note that when accounting for missing data using multiple imputation, a small difference in the estimated association between education and home learning scores was found between the imputed and non-imputed data. The difference did not affect the substantive interpretation of the result. Please refer to Appendix 7 for further details.

The average amount of television, videos or other digital content on a screen watched by the cohort member children varied by family income, primary caregiver ethnicity, primary caregiver education and family type, as displayed in Figure 18[14].

Figure 18. Minutes of screen use by demographic characteristics
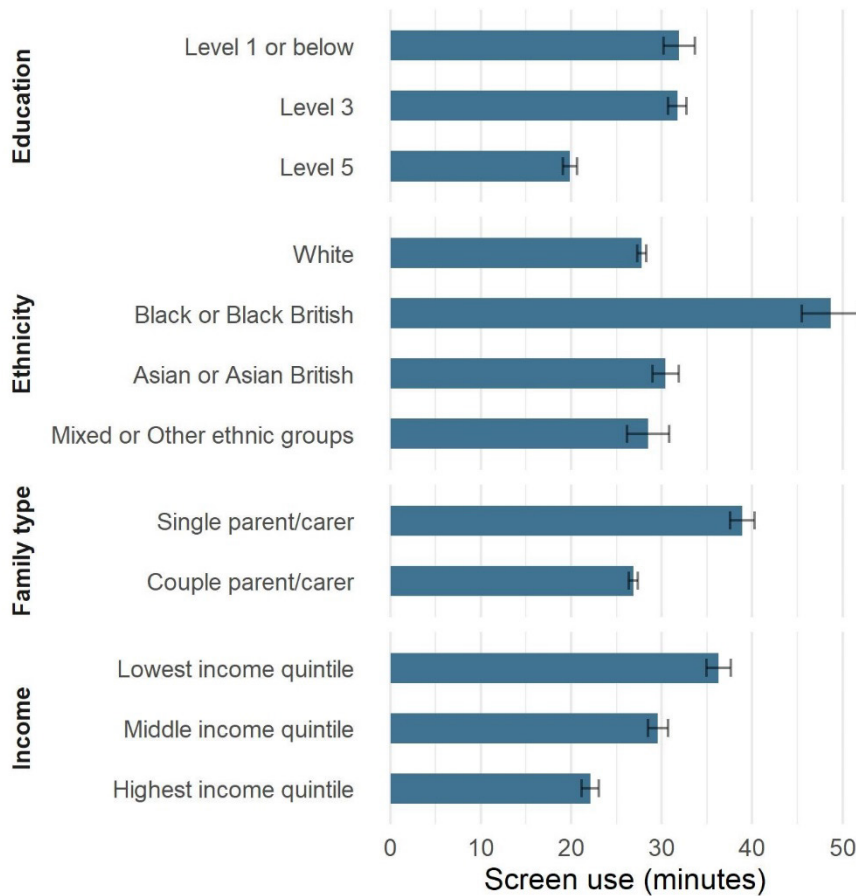
Base: All primary caregivers. Figure shows means and standard errors.   Source: COT20s wave 1
Note. Includes all children, including those who watched 0 minutes of digital content on a screen per day.

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the amount of time the cohort child spent watching television, videos or other digital content on a screen[15]. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, primary caregiver education, ethnicity and family type were each associated independently (over and above the association of other demographic

---

[14] Note that language comprehension development did not vary by the amount of time spent watching digital content on a screen, as explained in section 4.3.2.2.
[15] Analysis includes all children, including those who watched 0 minutes of digital content on a screen a day.

characteristics added to the analysis) with the amount of time the cohort child spent watching television, videos or other digital content on a screen[16].

The multivariate analysis indicated that children from higher income families typically spent less time watching digital content on a screen compared to those children from lower income families. Illustrating this, those children in the highest quintiles of family income spent on average 22 minutes a day watching digital content on a screen compared to 36 minutes a day for those who were in the lowest quintile of family income.

The analysis also indicated children with more highly educated primary caregivers watched less digital content on a screen per day than those with primary caregivers with lower levels of education. This is highlighted by the findings that those with primary caregivers with the highest level of educations watched on average 20 minutes of digital content on a screen a day compared to the 32 minutes that those with the lowest level of education watched.

The multivariate analysis showed that children from a single parent/carer household spent more time a day watching digital content on a screen. On average, children from single parent/carer households spent 39 minutes a day watching digital content compared to those from coupled parent/care households who watched on average 27 minutes of digital content on a screen a day.

Further, the multivariate analysis indicated that children with a primary caregiver of Black or Black British ethnicity were reported by their primary caregiver as spending more time one average a day watching digital content on a screen compared to children with primary caregivers from a White ethnic background. Illustrating this, children with a primary caregiver of Black or Black British ethnicity spent on average 49 minutes a day watching digital content on a screen compared to 28 minutes a day by children with a primary caregiver of White ethnicity.

4.2.3 Outdoor, green and natural spaces

A subgroup of 1489 primary caregivers who had registered with the BabySteps app (just under a quarter of all BabySteps users) were asked to report on the types of outdoor, green and natural spaces they visited with their baby in the previous month, and the frequency of use of such spaces. Appendix 9 describes the subgroup of primary caregiver who participated in the BabySteps 'How do you use greenspaces?' activity. The subgroup did not differ significantly from the whole sample in regard to family income but it was relatively less ethnically diverse than the overall COT20s sample and contained primary caregivers who were on average slightly older with slightly higher

---

[16] Note that when accounting for missing data using multiple imputation, a small difference in the estimated association between education and screen use was found between the imputed and non-imputed data. The difference did not affect the substantive interpretation of the result. Please refer to Appendix 7 for further details.

levels of education. These identified differences between those who completed the BabySteps activity and the whole cohort highlights that, although findings from the 'How do you use greenspaces?' are informative, they are not fully representative of the whole cohort.

Most of these primary caregivers reported that they took their child to an *outdoor, green and natural space* every day (42%) or once or twice a week (40%). Ten percent reported to visit an *outdoor, green and natural space* with their baby twice a week, 5% once a week, 2% once or twice a month and 1% less often than once a month. Less than 1% reported never visiting an *outdoor, green and natural space* with their baby.

The majority of primary caregivers reported taking their baby to a local park, playground, common or playing field (92%) or private or communal garden, patio or balcony (88%). The percentage of primary caregivers visiting other types of outdoor, green and natural spaces with their child in the last month is displayed in Table 6.

Table 6. Percentage of primary caregivers who visited each of the listed outdoor, green and natural spaces.

Green and natural space type	Percentage (%)
Local park, playground, common or playing field	92
Private or communal garden, patio or balcony	88
Woodlands or forest	42
Countryside	39
Coastal areas	38
Wetlands, rivers, lakes or canals	27
Other green spaces	7
No visits in the last month	<1
Unweighted Base	*1491*
Weighted Base	*1468*

Base: Primary caregivers who completed the task in BabySteps app.   Source: COT20s wave 1
Table shows column %

When considering the last outdoor green and natural space primary caregivers had visited with their baby, three quarters of primary caregivers reported to have spent between 30 minutes to 3 hours in that space. Figure 19 displays the percentage of primary caregivers who spent differing amounts of time in the last outdoor, green and natural space they visited with their child.

Figure 19. Amount of time caregivers spent in the last outdoor, green and natural space they visited with their child
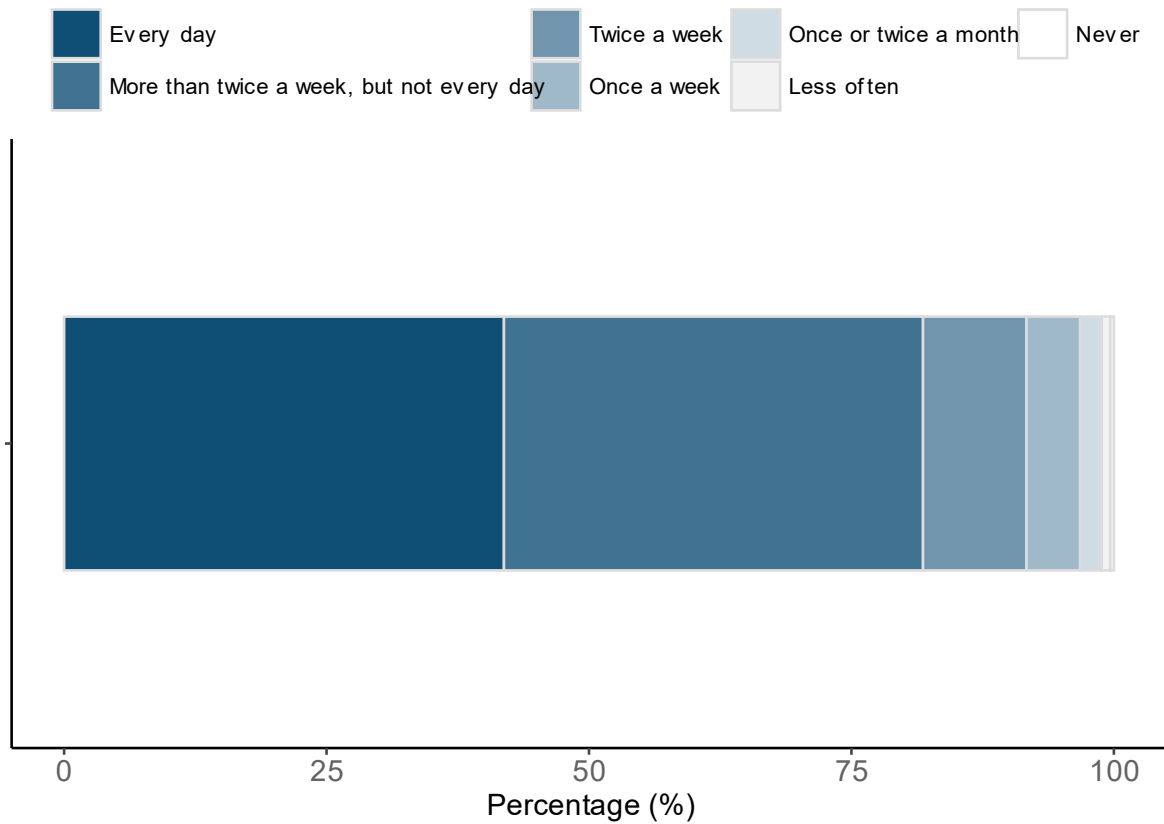
Base: Primary caregivers who completed the task in BabySteps app.
Source: COT20s wave 1

4.2.3.1 Demographic difference in access to or use of outdoor spaces

Figure 20 displays the frequency that primary caregivers spend their time in an outdoor, green or natural space with their child varied across families with differing family income, primary caregiver education, primary caregiver ethnicity, and family type.

Figure 20. Frequency of visits to outdoor spaces by demographic characteristics
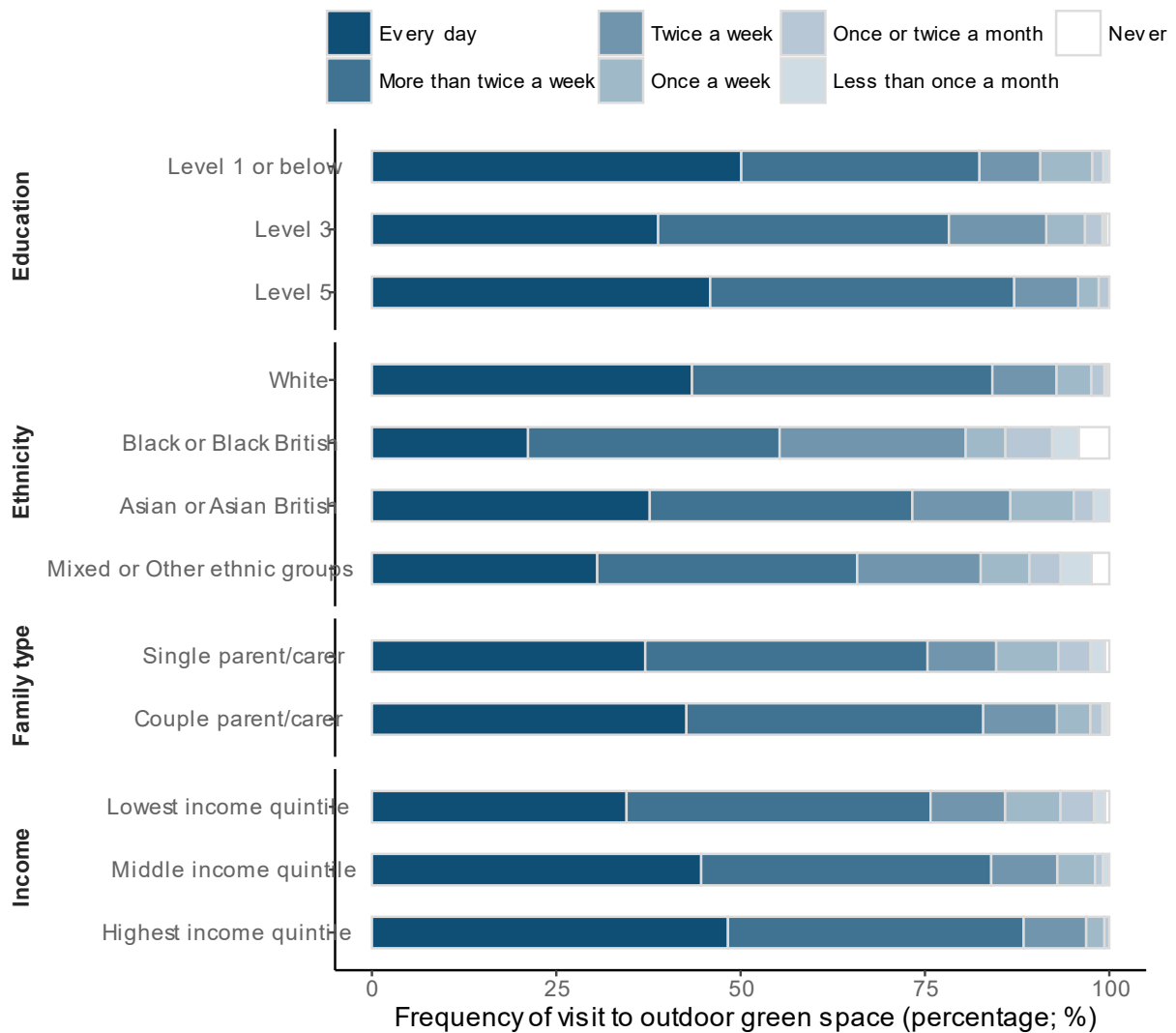
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the frequency that the primary caregiver took their child to an outdoor, green and natural space in the previous month. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family income, and primary caregiver ethnicity were each associated independently (over and above the association of other demographic characteristics added to the analysis) with the frequency that the primary caregiver took their child to an outdoor, green and natural space in the previous month.

The multivariate analysis indicated that primary caregivers from higher income families were more likely to have visited an outdoor, green and natural spaces more frequently with their child compared to primary caregivers from lower income families. To illustrate, 34% of those in the lowest income quintile visited an outdoor, green and natural spaces every day, compared to 48% of those who were from the highest income quintile.

By ethnicity, the multivariate analysis suggested that primary caregivers of Black or Black British ethnicity or of Mixed/Other ethnicity were less likely to have visited outdoor, green and natural spaces frequently, as indicated by the 21% and 31% of primary caregivers of Black or Black British and of Mixed/Other ethnicity, respectively, who were able to take their child to an outdoor, green and natural space every day, compared to 41% of primary caregivers of White ethnicity.

4.3 Home learning environment and early child development

4.3.1 Language development

Early language comprehension is an important early developmental milestone. A shortened version of the widely used caregiver-report UK Communicative Development Inventory Words & Gestures form (CDI; version UK-CDI Words & Gestures – Brief) was administered to assess how many words from a list of 51 everyday words the child *understands*[17].

At age 9.5 months, children were reported by their primary caregivers to understand an average of 14 words from the set of 51 provided (note this figure should not be taken to directly estimate the total number of words a child understands). The number of words the children understood was compared to a subset of 351 children from the CDI UK population-representative pre-pandemic group of children (Alcock, 2020; data collection between 2012 and 2016) who were of the same age to the majority of the COT20s cohort sample (children aged older than 8 months and less than 11 months). Although this comparison sample has fewer cases than the current cohort dataset, the reference sample was broadly population representative and, importantly, was obtained prior to the COVID-19 pandemic. Additionally, neither the age nor indices of multiple deprivation quintiles were statistically significantly different between the COT2020s and the reference group highlighting the comparability of the two samples (see Appendix 10 for mean number of words by month of age and Appendix 11 for more details of the comparison between the COT20s and CDI samples).

The mean number of words understood by the current cohort children did not differ from the mean of the population-representative CDI UK sample (with mean values of 14.16 and 14.57, respectively, as shown in Figure 21), indicating that language development, specifically word comprehension, in the current cohort does not differ significantly from the population-representative pre-pandemic group of children that were used to norm-reference the CDI in the UK.

---

[17] The questionnaire asked word comprehension regardless of language by stating in the question instructions "if your child uses or understands a different word with the same meaning (e.g., nana for grandma) or in a different language, please count that".

Figure 21. The mean number of words understood by the COT20s compared to those understood by the UK-CDI norm-reference dataset
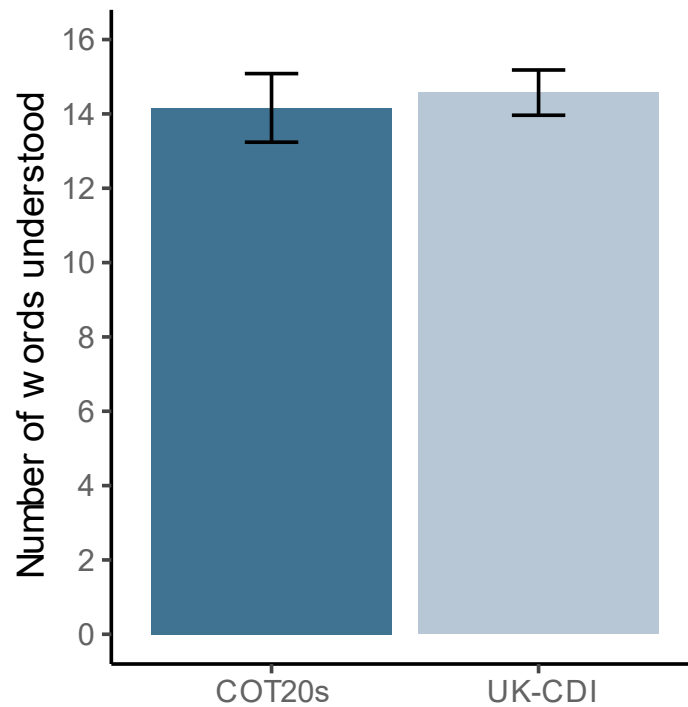
Base: COT20s children UK-CDI children.   Source: COT20s wave 1 and CDI reference data.
Figure shows mean and error bars denote standard error.

4.3.2 Home learning environment and language development

4.3.2.1 Home learning activities

The amount and quality of stimulating home learning activities a child experiences is known to play an important role in their language development, although the combined home learning activities score reported here only captures certain aspects of the wide range of possible home learning interactions. Nevertheless, overall, children who experienced a higher frequency of home learning activities were reported to understand a larger number of words at the time of the survey, when the babies were on average 9.5 months of age. Children whose primary caregiver reported engaging in turn-taking play[18] several times a day understood 5 more words on average than those who were never engaged in this activity. Those who were read to several times a day understood 4 more words on average, and those who were engaged in physical play understood 3 more words, than those who were never engaged in the respective activities. See Appendix 12 for the mean number of words child understood by type and frequency of home learning activity.

---

[18] Turn-taking refers to play without toys/other objects—for example, peek-a-boo, pat-a-cake, 'where's baby's eyes?', 'I spy'.

To determine the combined effect of the complete set of home learning activities on language comprehension, we used the home learning score described previously in section 4.2 and analysed its association with the child's language comprehension[19]. When adjusting for the age of the child, a higher home learning environment score was significantly associated with more words being understood by the child. Figure 22 demonstrates the mean number of words understood by children across thirds (tertiles) of the home learning combined score. On average, children in the lowest third of home learning scores understood 1.43 fewer words than those in the middle third, and 0.91 fewer words than children in the highest third.

Figure 22. Mean number of words understood by levels of home learning combined score[20]
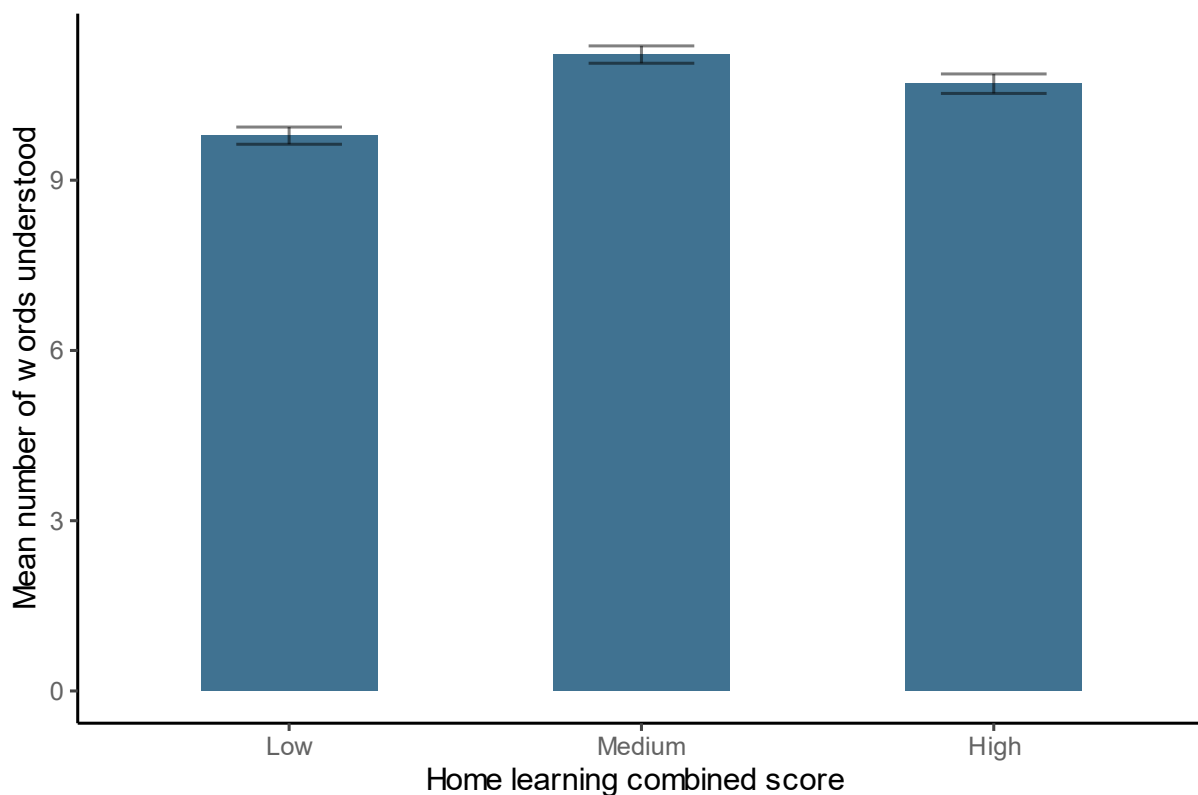
Base: All primary caregivers.   Source: COT20s wave 1
Columns represented mean, error bars denote standard error.

---

[19] Frequency response options were first transformed into numeric scores ("Never" = 1, "Several times a day" = 6). The sample mean of composite home learning environment score was 58.98 (SD=5.81).
[20] Responses from the 11 home learning activities/interactions were summed to create a combined home learning score. The scores were then categorised as "low", "medium", and "high". This denotes weighted normalized tertiles (thirds), where the scores from the whole group have been divided into three equal parts. The lower tertile, representing "low" a home learning score (scores between 21 and 58), contains scores that are in the bottom one-third of the distribution. The middle tertile, representing "medium" a home learning score (scores between 59 and 62), contains scores that fall in the middle one-third of the distribution. The upper tertile, representing "high" a home learning score (scores between 63 and 66), contains scores that are in the top one-third of the distribution.

4.3.2.2 Screen use

When adjusting for age of the child, there was no relationship between the amount of time spent watching digital content on a screen and the number of words the child could understand.

4.3.2.3 Outdoor, green and natural spaces

When adjusting for age of the child, there was no relationship between the amount of time spent visiting outdoor, green and natural spaces and the number of words the child could understand.

4.4 Summary

Previous evidence shows that an enriching home environment and stimulating caregiver-lead interactions and activities are crucial for supporting early childhood development. Emerging language abilities at age 9 months provide an important indication of children's early developmental progress, and charting this progress over time, both within the language domain and beyond, is a key objective of the longitudinal design of the COT20s study. Measuring the activities and interactions that support these developmental achievements early in life can provide vital information about the determinants of later child outcomes.

Primary caregivers typically engaged in frequent stimulating, playful interactions with their babies. At least 80% reported cuddling, playing with toys and talking to their child several times a day, and more than half engaged in physical play, turn-taking play, singing to child, pretend games and noisy play several times a day. The least frequent activity at age 9.5 months was reading to the child. There were some socio-economic disparities in the frequency of home learning activities, with higher frequency and variety of home learning activities among higher income, more educated primary caregivers, as well as those of White ethnicity. How these differences might relate to other household and economic variables (such as access to childcare, social support, availability of neighbourhood resources) will be important to consider in future analyses of the COT20s study.

A further finding highlighted that 72% of cohort children typically watched some digital content on a screen each day, while 28% of cohort children did not. For the overall sample, the average amount of viewing time per day was 29 minutes and for those that did watch some digital content, their average was 41 minutes. Screen use also showed evidence of socio-economic differences: higher income and more educated families, along with coupled parent/carers, reported, on average, less screen time for their child compared to those of lower income, lower education levels and single parent/carer families. By ethnicity, primary caregivers of Black or Black British ethnicity reported their children spent more time on screens compared to those of White ethnicity.

Caregivers reported frequently visiting outdoor green spaces with their babies (daily for 42%, weekly for a further 40%). However, there was evidence of socio-economic disparities, with higher-income families and those of White ethnicity reporting more frequent use of outdoor spaces.

At around 9.5 months, children were reported to understand 14 words on average from a sample set of 51 words, which was equivalent to pre-pandemic norms. A higher frequency and variety of caregiver-led home learning activities and interactions was associated with increased child language comprehension, but interestingly, the amount of screen time per day was not associated with language comprehension.

Taken together, these findings highlight the importance of the home learning environment for early development and indicate that demographic disparities in the home learning environment become evident in the first year of life. Tracking the longer-term effects of variation in the home learning environment is an important objective of the COT20s study in order to identify areas for potential intervention and policy development aimed at enhancing children's outcomes.

5 Early education and care environments

<div class="key-findings">

Key findings

- By the time the cohort children were age 9.5 months on average, 43% of families had used some form of early childhood education and care (ECEC) provision (informal or formal) on a regular basis, while 57% had not used any regular ECEC provision.
- 13% regularly used *formal* ECEC, most often day nurseries (6%), nursery schools (3%) or childminders (3%).
- Those families using formal ECEC typically did so for around 18 hours per week and had started when the child was on average 8 months old.
- Over a third of families (37%) had regularly used *informal* care, mainly from grandparents (34%), other relatives or friends.
- Families using informal care arrangements did so typically for 11 hours per week and had started when the child was on average 5 months old.
- Demographic differences in the use of informal or formal childcare were observed:
  - Among families in the highest quintile of family income, 40% regularly used informal childcare and 23% used formal childcare, compared to lower proportions (31% and 4%, respectively), of families in the lowest income quintile.
  - 23% of primary caregivers with the highest qualification level regularly used formal childcare, compared to 3% with the lowest qualification levels.
  - Single parents/carers were more likely to use informal childcare, and less likely to use formal childcare, than couple families. Among single parent households, 40% regularly used informal childcare and 9% regularly used formal childcare, compared to coupled parent households where 37% regularly used informal childcare and 14% regularly used formal childcare.
  - A higher proportion of primary caregivers of White ethnicity had regularly used some form of childcare (formal, informal or both) than those of other ethnic groups. By the time the children were age 9.5 months on average, 45% of White primary caregivers had regularly used any ECEC compared to 34% of Black or Black British primary caregivers and 31% of Asian or Asian British primary caregivers.

</div>

This chapter examines children's early experiences of formal and informal early childhood education and care (ECEC), which is an important influence on young children's learning, stimulation and levels of social interaction. This chapter also investigates ECEC usage by family income, primary caregiver education, primary caregiver ethnicity and family type to explore potential sources of disparities (see Appendix 1 for full details).

5.1 Background

Children's early environments have a critically important influence on their development (Unicef, 2017). The care experienced in formal and informal ECEC settings can influence children's development and later outcomes in important ways (Unicef, 2019). Participation in high quality formal ECEC provision has generally been shown to benefit children's development when accessed at older pre-school ages (i.e., age two years and older), although the evidence is more mixed when formal care is accessed at younger ages (Hansen & Hawkes, 2009).

The COT20s study will capture patterns of ECEC use throughout the pre-school period, providing new insight into the interactions between duration of care and quality of care environments, and outcomes for parents and children, both contemporaneously and over the longer-term.

The first wave of the COT20s study collected information about the use of both formal and informal ECEC provision.

Formal ECEC includes the following categories: –

- Childminder
- Professional nanny
- Day nursery
- Nursery school
- Pre-school of playgroup
- Special day school or nursery unit for children with special educational needs.

Informal ECEC includes care provided on a regular basis by a relative, friend or neighbour in a domestic setting on an individual basis. It includes arrangements with an au pair but does not include care provided by the child's other parent (regardless of whether cohabiting with the child's primary caregiver).

A key aim of the COT20s study is to capture the use of ECEC and its interaction with employment status, parental leave and economic disadvantage. This chapter reports on the types of informal and formal provision, the age at which children started receiving formal ECEC, and the average time spent in formal early education settings. This chapter looks at variation in usage of forms of informal and formal childcare by social and economic circumstances.

5.2 Families' use of ECEC

5.2.1 Types of ECEC provision used regularly

In total, 43% of families had regularly used some form of ECEC for the cohort child by the time they were 9.5 months old. The different types and durations of ECEC used by families are displayed in Table 7. Thirteen percent of families had regularly used *formal ECEC* for the cohort child or children. The majority of families reporting formal ECEC had used *group-based* provision (9% of the sample) while 4% of the sample had used formal *individual* provision.

For families regularly using formal ECEC, the most common provider type was day nurseries, with 6% of families reporting having regularly used day nurseries an average of 18 hours a week for an average of two months. Other common types of formal provision were childminders (3%) and nursery schools[21] (3%).

Thirty-seven percent of families had regularly used *informal ECEC*. The most common informal arrangement involved relatives, with 36% of families reporting that the cohort child or children were looked after on a regular basis by a relative. For most families, these arrangements included a grandparent, either the primary caregiver's parent (in 29% of families) and/or their partner/other parent's parent (in 14% of families). Overall, grandparents played a substantial role in providing care for the cohort children: in 34% of families, grandparents provided regular informal childcare, for an average of 12 hours a week and an average of four months in total since the child was born.

Seven percent of families regularly used a combination of formal and informal ECEC provision in the first 9-14 months of the child's life.

As reported in section 2.2.5, 39% of primary caregivers were currently working (employed or self-employed), 1% were full-time students and 3% were looking for work or about to start a job. This is broadly comparable to the 43% of families who had regularly used some formal of ECEC (formal and/or informal).

Fifty-seven percent of families reported not having regularly used any ECEC provision (either formal or informal) for the cohort child or children in the first 9-14 months of the child's life.

---

[21]*Nursery Schools*: there is a small number of maintained nursery schools in England offering ECEC provision for children under 2 years of age. The Childcare and Early Years Survey of Parents (CEYSP) 2021 study found discrepancies between parents/carers' reported provider type and the final classification following validation: parents/carers over-reported using a nursery school (by 7%) and under-reported using a day nursery (by 8%).

Table 7. Type and duration of ECEC regularly used by families for the cohort child by age 9.5 months old

ECEC type	Percentage of families who had regularly used this type (%)	Average hours per week of usage	Average number of months of usage	Average age (month) on entry
Formal childcare	**13**	**18**	**2**	**8**
Day nursery	6	19	1	8
Childminder	3	18	1	8
Nursery school	3	18	2	8
Professional nanny	<1	18	2	6
Pre-school or playgroup	<1	7	2	6
Special school/day nursery	<1	7	4	4
Informal childcare	**37**	**11**	**4**	**5**
Relative/s	36	12	3	5
Friend or neighbour	3	5	3	5
Au pair	<1	26	2	6
Other	<1	18	5	3
No ECEC used	57	-	-	-
Unweighted Base	*8559*	-	-	-
Weighted Base	*8547*	-	-	-

Base: All cohort families. Table shows column % and averages   Source: COT20s wave 1
of those using each provision (averages are not taken from whole sample).

5.2.1.1 Demographic difference in types of ECEC provision used

Figure 22 displays the percentages of families who regularly used formal, informal, both formal and informal or no ECEC provisions across differing family incomes, primary caregiver education level, primary caregiver ethnicity and family type.

Figure 23. Type of ECEC regularly used by demographic characteristics
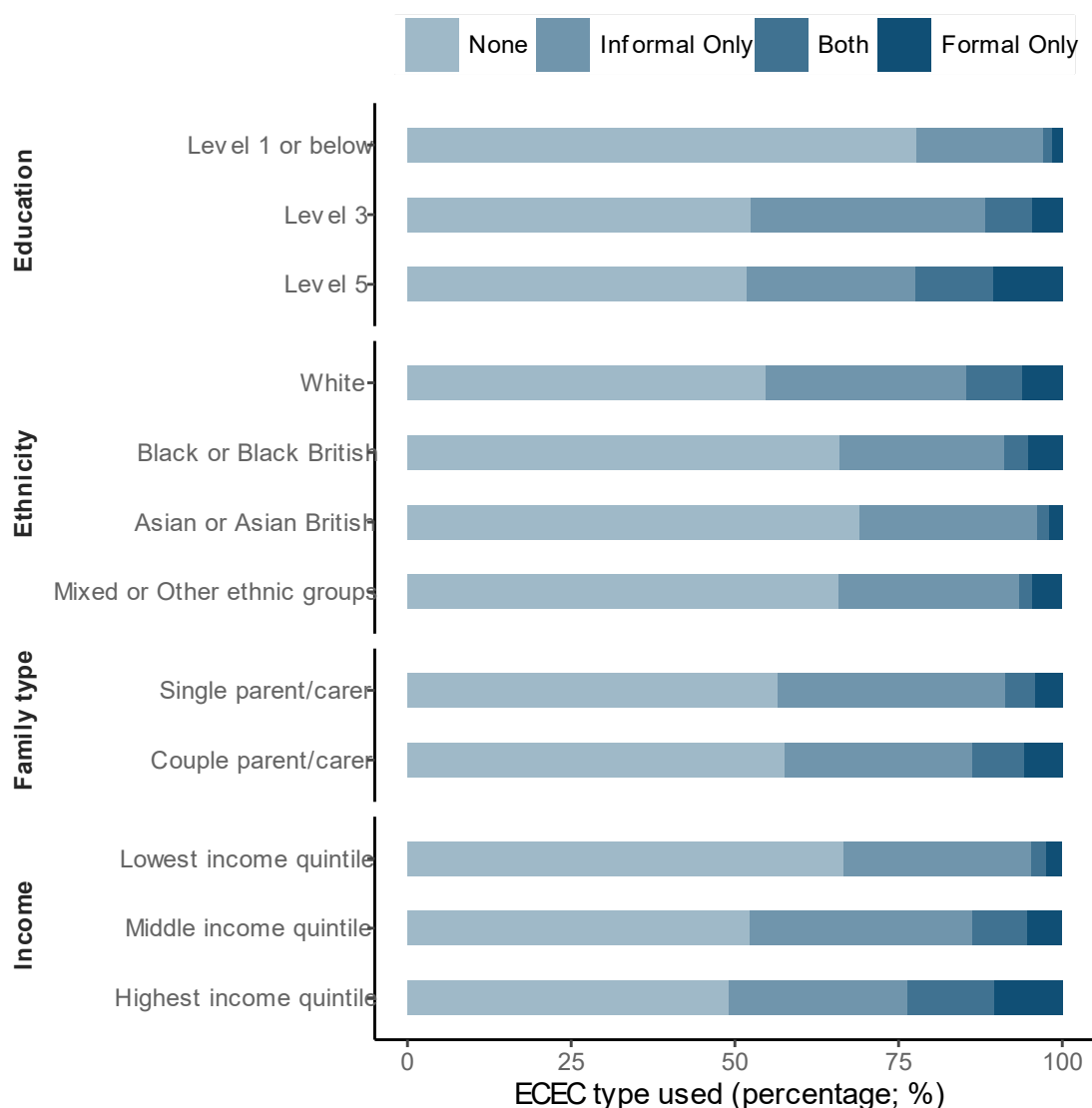
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis[22], was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with the likelihood of using both formal/informal ECEC versus not using formal/informal ECEC[23]. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate family type, family income, primary caregiver education, and primary caregiver ethnicity

---

[22] Models with informal and formal childcare use as outcome variables included primary caregivers current occupation as a covariate in the analysis. Occupation was defined as a binary variable as 'currently working, training, volunteering or studying' versus 'not currently working (on parental leave, looking after family, retired, sick or other)'

[23] Two separate models were conducted. One to determine the independent association of each of the demographic variables on likelihood of using formal ECEC versus not using formal ECEC (which could include informal ECEC users and/or no ECEC users), and another model to demine the same association on the likelihood of using informal ECEC versus not using informal ECEC (which could include formal ECEC users and/or no ECEC users).

were each associated independently (over and above the association of each of the other demographic characteristics) with whether the primary caregiver used both formal and informal ECEC provisions.

Multivariate analysis indicated that families with higher incomes were more likely to regularly use formal and/or informal childcare than those of lower income. Illustrating this, of families in the highest quintile of family income, 40% regularly used informal childcare and 23% used formal childcare, while of families in the lowest quintile 31% regularly used informal childcare and 4% regularly used formal childcare.

The multivariate analysis also highlighted that families with a primary caregiver with a higher level of education were more likely to regularly use formal childcare than those with a primary caregiver with a lower level of education. Illustrating this, of primary caregivers in the highest qualification level group, 23% regularly used formal childcare, compared to the lowest qualification level group where 3% regularly used formal childcare.

Further, multivariate analysis showed that single parent households were more likely than coupled parent households to regularly use informal childcare, but less likely to use formal childcare. Of single parent households, 40% regularly used informal childcare and 9% used formal childcare, compared to coupled parent households where 37% regularly used informal childcare and 14% regularly used formal childcare.

The multivariate analyses showed that primary caregivers of Black or Black British, Asian or Asian British or Mixed/Other ethnicity were less likely to regularly use informal childcare compared to those of White ethnicity. To demonstrate this, of those primary caregivers who were of Black or Black British, Asian or Asian British or Mixed/Other ethnicity 29%, 29% and 30% regularly used informal, respectively, compared to 39% of White primary caregivers. The analysis also showed that primary caregivers of Asian or Asian British or Mixed/Other ethnicity were less likely that those of white ethnicity to use formal childcare. And of those primary caregivers who were of Asian or Asian British or Mixed/Other ethnicity 2% and 8% regularly used formal ECEC, respectively, compared to 15% of White primary caregivers.

5.2.2 Amount of ECEC used

By the time children were 9.5 months on average, the 37% of families who used informal ECEC arrangements regularly used them on average 11 hours a week. Typically, these families had used this form of childcare on a regular basis for 4 months starting from when children were an average of 5 months of age. Most of the families who had regularly used informal ECEC were still using it in some form at the time their child was aged 9.5 months (35% of all families).

Formal ECEC was used for more hours on average than informal care, but had been used for a shorter period of time, reflecting a later starting age. Families typically used formal ECEC arrangements for an average of 18 hours per week but had only been using these arrangements for an average of 2 months. For those who were regularly using formal ECEC provision the average age of entry was 8 months. Most families who had reported having regularly used any formal ECEC were still using some form of formal provision at aged 9.5 months (12% of all families).

5.3   Summary

Evidence suggests that attending early education settings promotes early learning and development, and that the gain is greatest in higher quality ECEC settings.

In total, 43% of families had used some form of ECEC provision on a regular basis since their child was born, whether it was an informal arrangement (such as care for by a relative, friend or neighbour) or a formal one (such as nursery schools, day nurseries, pre-schools or playgroups, childminders, special day school, nursery or unit) or both; 57% had not used any regular ECEC provision since their child was born.

At age 9.5 months, 37% of families regularly used informal care (mainly from grandparents) and did so typically for 11 hours per week, starting when the child was 5 months. Contrastingly, only 13% regularly used formal ECEC. These families typically did so for around 18 hours weekly (starting when the child was 8 months), most often in day nurseries (6%), nursery schools (3%) or childminders (3%). A higher proportion of higher income families and more highly educated primary caregivers had regularly used formal ECEC. There were comparatively large differences in formal ECEC use between those with lower and higher levels of formal education, independent of overall family income. Single parent households tended to use informal childcare more and formal childcare less than coupled parent households. Both formal and informal usage varied by ethnicity, with primary caregivers of Black/Black British or Asian/Asian British or Mixed/Other ethnic backgrounds less likely to use informal ECEC compared to those with White ethnic backgrounds. Primary caregivers of Asian/Asian British or Mixed/Other ethnic backgrounds were less likely to use formal ECEC provisions compared to those with White ethnic backgrounds.

Overall, the current findings indicate that, even at this early stage, demographic differences exist in ECEC usage. The COT20s study will collect evidence on ECEC usage at each wave, to enable analysis of the degree to which the cumulative extent and timing of ECEC provision influences children's learning, development and wellbeing.

6 Service use

Key findings

- In the 9.5 months on average since their child was born, almost all primary caregivers saw a health visitor (97%) and the majority saw a midwife (88%) or a General Practitioner (GP; 87%). Fewer than 1% of families had not seen any professional since the baby was born.
- 24% of primary caregivers reported difficulties accessing a GP and 19% reported difficulties accessing a health visitor.
- Access to health visitors and GPs varied by family characteristics and region:
  - Single parents were 30% more likely to report experiencing difficulties accessing a health visitor than coupled parents/carers, when holding other demographic difference constant.
  - 22% of primary caregivers with the highest level of education reported difficulties accessing a health visitor compared to 3% with the lowest.
  - 25% of those in the lowest income quintile experienced difficulties when accessing a GP compared to 22% in the highest income quintile.
  - In the county/unitary area with the highest rate of reported difficulties accessing a GP, 16% of participants, on average, reported that difficulties accessing a GP were a 'big problem' for them, compared with 6% in the county with the lowest average rate.
- Since their child was born, the most frequently used child and family support services were baby classes (used by 38% of primary caregivers), playgroups or play sessions (37%), and breastfeeding support (26%). However, 36% of had not used any of the 15 activities or support services listed in the survey.
- 32% of primary caregivers had paid to attend baby classes and 13% had paid for breastfeeding support.
- Fifteen percent of COT20s participants said they had used a service offered by a family hub or children's centre since their baby was born.
- The services most frequently accessed through a family hub or children's centre were: playgroups or play sessions, health visitors, baby classes, breastfeeding support, and support/check-ups for infant weight and growth.
- Demographic differences in the reported use of family hubs and children's' centres were observed:
  - Of families in the highest income quintile, 25% reported using a family hub/children centre compared to 18% in the lowest income quintile.
  - Of primary caregiver with the highest education levels, 26% reported using a family hub/children centre compared to 16% with the lowest.
  - 15% of families with a primary caregiver of Asian or Asian British ethnicity reported using a family hub or children's centre compared to 24% of families with a primary caregiver of White ethnicity.

This chapter outlines families' use of, or access to, services in the first months of their children's lives. It describes the amount of contact with professionals and services that are related to infant health and development and explores access to family hubs and children's centres. The chapter also examines demographic differences in service use access by cross-analysing these by family income, primary caregiver education, primary caregiver ethnicity and family type to explore potential sources of health disparities (see Appendix 1 for full details).

6.1 Background

The period from conception to age two has a significant impact on the health, wellbeing, and opportunities of babies and children throughout their lives. The government published Best Start for Life: A Vision for the 1,001 Critical Days in March 2021 (Department of Health and Social Care, 2021), which sets out a vision for improving support for families from conception to age 2. It includes a coherent and joined up 'Start for Life' offer that articulates clearly to parents and carers what services are available and how they can be accessed (Department of Health and Social Care, 2021).

Family hubs are designed to be 'one stop shops' that make it easier for families to get the support they need. They bring together a range of services for children of all ages (0 to 19 years old, or up to 25 years old for children with Special Educational Needs and Disabilities), with a Start for Life offer at their core. The hub approach means professionals and partners are expected to be able to work together more effectively, with a focus on supporting and strengthening family relationships.

The Government is investing around £300 million (until March 2025) to enable 75 local authorities in England to create family hubs, and to improve vital services to give every baby the best start in life. This builds on the Government's previous investment, including a £12 million transformation fund to open family hubs in a further 12 local authorities in England. At the time of this survey, local transformation to family hubs was only just beginning in the areas receiving government family hubs transformation funding. Therefore these 87 areas would not yet have had sufficient time to open or further develop their family hubs. Thus, as well as providing a description of service use among families with infants born in late 2021, this chapter can be thought of as also providing a baseline of service and family hub usage across England prior to this government investment.

Prior to this policy, other integrated family centres (mainly Sure Start children's centres) have been available in many communities and have enabled parents of children up to the age of 5 years to access a range of services in one location, with enhanced referral to specialised services as required.

6.2 Professionals and services used

By the time the children were age 9.5 months on average, primary caregivers reported having had contact with a range of professionals (such as health visitors, midwives, and GPs) and services since the cohort child was born (such as playgroups, baby classes, breastfeeding support, or mental health support). Note that primary caregivers were not asked to report on whether their contact with professionals and their use of services were related to the cohort baby specifically, rather than another child or themselves (though most professionals and services listed in the questions were relevant to children's health and development).

In the 9.5 months (on average) since their child was born, almost all primary caregivers saw a health visitor (97%) and many of them saw a midwife (88%) or a General Practitioner (GP; 87%). Fewer than 1% of primary caregivers had no contact at all with any of the professionals listed. When asked about their access to a list of 15 different community services for children and families, primary caregivers reported that the most used services were baby classes (38%), playgroups (37%), and breastfeeding support (26%). Thirty six percent of families did not use any of the services listed (and did not report using other services). Since their child's birth, primary caregivers reported on average to have seen 4 different types of professionals (SD = 1) and to have used 1 type of service (SD = 2).

The details of the most commonly used professionals and services are described further in the sections below. Appendix 13 for full list of the number of times families saw/used each of the most common professionals and services.

Table 8 and Table 9 report the percentage of primary caregivers who had contact with each type of professional and used each type of service respectively.

Table 8. Percentage of primary caregivers who had seen each professional in the 9.5 months since their child's birth

Professional Seen	Percentage (%)
Health Visitor (universal)	97
Midwife (universal)	88
General Practitioner (GP) (universal)	87
Consultant/hospital doctor (specialist)	31
Family Nurse, including Family Nurse Partnership (FNP) Nurse (specialist)	22
Paediatrician (specialist, unless related to SEND)	18
Paediatric Physiotherapist (specialist, unless related to SEND)	3
Social Worker (specialist)	3
Family Support Worker / Early Help Worker (specialist)	2
None of the professionals listed	<1
Unweighted Base	*8578*
Weighted Base	*8562*

Base: All primary caregivers. Table shows column %　　　　Source: COT20s wave 1

Table 9. Percentage of primary caregivers using each service in the 9.5 months since their child's birth

Service Used	Percentage (%)
Baby classes (e.g. baby massage, baby yoga groups, baby swimming, signing groups, sensory groups)	38
Playgroup or play sessions (e.g. stay and play groups, one o'clock clubs, baby singing groups, messy play groups)	37
Breastfeeding support	26
Infant weight and growth	14
Infant feeding support/weaning/nutrition	10
Mental health support	8
Baby and infant health advice and support	5
Infant sleep support	3
Parenting support/parenting classes	2
Housing advice and support	2
Family relationships support	1
Money or debt advice and support	1
Advice and services for my child's disability or learning needs	1
Jobs and training advice and support	<1
Drug and alcohol support	<1
Other (e.g. First aid course, Dietician)	<1
No services used	36
Unweighted Base	*8552*
Weighted Base	*8538*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

6.2.1 Health visitors

Health visitors were the most frequently seen professionals. Ninety-seven percent of primary caregivers had contact with a health visitor since the baby was born, and 95% had their 6-week health visitor review. On average, primary caregivers saw a health visitor 3 times (SD = 2). The majority of primary caregivers (70%) had contact with a health visitor between 1 to 3 times, 27% had 4 or more contacts, while 3% had no contact.

6.2.1.1 Demographic differences in the difficulty accessing a health visitor

Nineteen percent of primary caregivers reported having difficulties in accessing a health visitor during the previous 12 months. Six percent of all primary caregivers considered this to be a big problem; for 8% this was a minor problem and for 4% this was not a problem.

The patterns of experiencing difficulties when accessing a health visitor varied somewhat across families with different levels of family income, primary caregiver education and ethnicity, and family type, as displayed in Figure 24.

Figure 24. Difficulties in accessing a health visitor by demographic characteristics
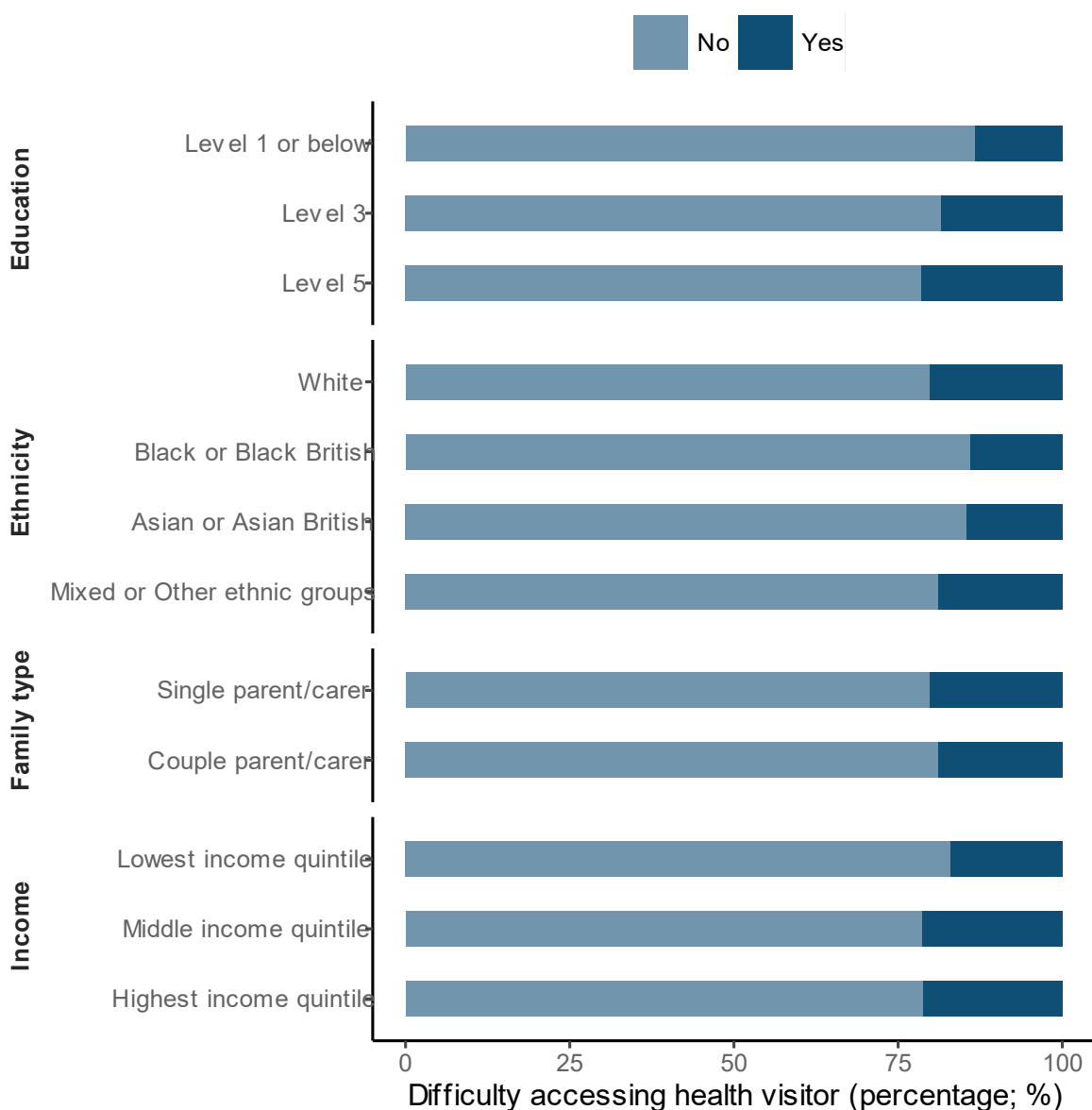
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with difficulties accessing a health visitor. This analysis tested the independent effect of each

demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicate primary caregivers education level, ethnicity and family type were each associated independently (over and above the association of other demographic characteristics added to the analysis) with difficulties accessing a health visitor.

The multivariate analysis indicated that primary caregivers with the highest education level were more likely to report experiencing difficulties in accessing a health visitor. 22% of those with the highest education levels reported this, compared to 3% of those with the lowest education levels.

The multivariate analysis also indicated that single parents were more likely to face difficulties in accessing a health visitor compared to those who are coupled parent/carers/ When considering the association between being a single or couple parent/carer and the experience of difficulties when accessing a health visitor in a multivariate analysis when holding the effect of the other demographic variables constant, single parents were 30% more likely to report that they had experienced difficulties than coupled parent/carers.

Additionally, the analysis indicated that primary caregivers with a Black or Black British and Asian/Asian British ethnic background were less likely to report difficulties when accessing a health visitor compared to those of White ethnicity, with 13% of primary caregivers with a Black or Black British ethnicity and 15% of those with an Asian/Asian British ethnic background, compared to 20% of those with a White ethnic background experiencing difficulties when accessing a health visitor.

6.2.1.2 Regional differences in the difficulty accessing a health visitor

To examine disparities in accessing a health visitor by location, analysis was conducted at the level of county and region, the smallest unit of geography for which robust estimates from the COT20s sample are possible. Across the English counties/unitary authorities (which were mapped according to 2021 data from the Office for National Statistics Open Geography Portal) the number of families within each area ranged from 23 to 309. To ensure that the estimates had a reasonable level of precision, we restricted analyses of geographical disparities to the 34 counties or unitary authorities that contained at least 100 COT20s families (London Boroughs were merged into 5 groups, West London, North London, East London, South East London and South London, because no individual London borough contained 100 or more COT20s participants). The geographical unit of analysis was therefore the county, unitary authority, or, in the case of London, merged boroughs. As shorthand, we refer to these as counties in the text below. The analyses revealed evidence of small but reliable differences in rates of reported difficulties accessing health visitors by area. Figure 25 shows the differences between the county with the highest rates of reported difficulties (on the right-hand side) and those with the lowest rates (on the left-hand side). The error bars show 95% confidence intervals.

Figure 25. County-level disparities in reported difficulties accessing health visitor support
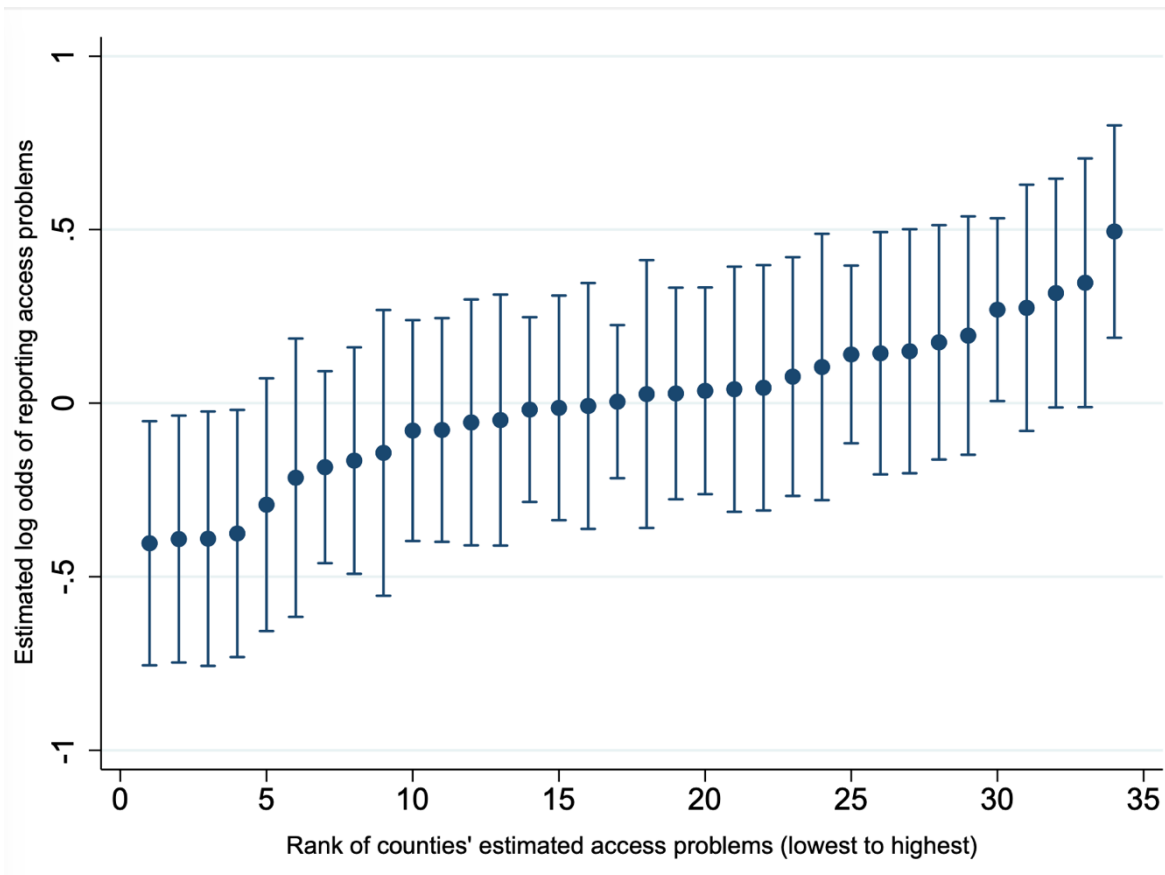
Base: All primary caregivers in counties with >99 families.   Source: COT20s wave 1
Y-axis shows the log odds of reporting access problems relative to the average of the sample as a whole (zero is the overall average). Log odds can be thought of as similar to probabilities. The error bars are 95% confidence intervals.

In the county with the highest rate of reported difficulties, 9% of participants, on average, reported difficulties that were a 'big problem' for them, whereas in the county with the lowest rate this was 4%. Overall, county-level disparities accounted for 2.3% of the total variation. These differences were not accounted for by county-level deprivation indices (IDACI) or rurality, but were linked to England region, with the lowest rates of reported problems in Yorkshire and Humber and South East of England (4% each), and the highest rates in the West Midlands and the South West (7% each). See Appendix 14 for access rates of all 9 regions.

6.2.2 Midwives

A total of 88% of primary caregivers had had contact with a midwife since the child was born. On average, primary caregivers saw a midwife 3 times (SD = 2) since their child was born. Most primary caregivers, 65%, had contact with a midwife between 1 to 3

times since the child was born; 23% had had 4 or more contacts, while 12% had no contact.

6.2.3 General Practitioners (GP)

Eighty-six percent of primary caregivers had had contact with a GP since the cohort child was born. On average, primary caregivers saw a GP 3 times (SD = 2) since their child was born. Most primary caregivers (70%) had seen the GP between 1 to 3 times since the baby was born, 17% saw a GP 4 or more times, while 13% had no contact.

6.2.3.1 Demographic difference in the difficulty accessing a GP

Overall, 24% of primary caregivers reported having difficulties in accessing a GP in the previous 12 months. For 10% this was considered to be a big problem; for 9% this was a minor problem; and 4% considered their difficulty in accessing a GP to not be a problem. The patterns of experiencing difficulties when accessing a GP varied across families with different levels of family income, primary caregiver ethnicity, and family type, as displayed in Figure 26.

Figure 26. Percentage of families experiencing difficulties in accessing a GP
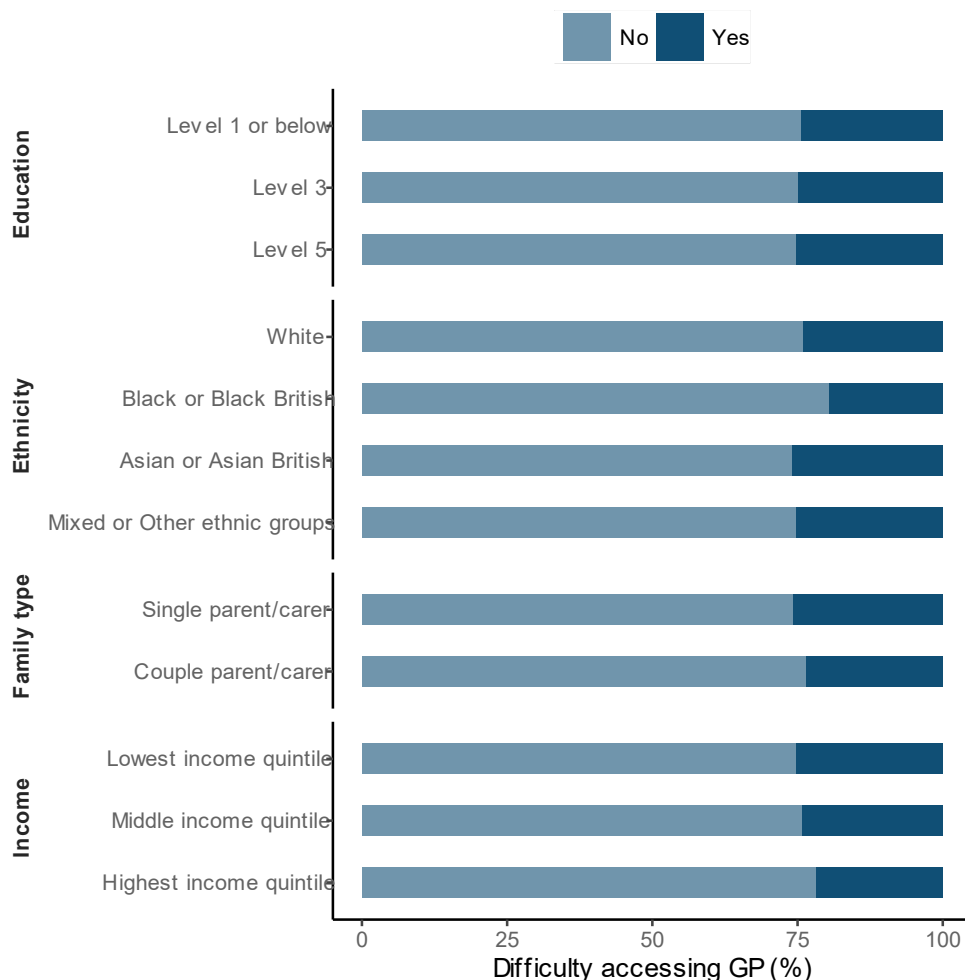
A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity and family type were independently associated with experiencing difficulties when accessing a GP. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis.

The findings indicated that family income was associated independently (over and above the association of other demographic characteristics) with experiencing difficulties with accessing a GP. To illustrate this finding, 25% of those in the lowest income quintile experienced difficulties when accessing a GP compared to 22% in the highest income quintile.

6.2.3.2 Regional differences in the difficulty accessing a GP

There were regional differences in the proportion of primary caregivers who reported difficulties accessing a GP. The regional disparities in problems accessing a GP were somewhat larger in this case than for health visitors. The rates of problems accessing a GP by location are shown below in Figure 27.

Figure 27 County-level disparities in reported difficulties accessing a GP
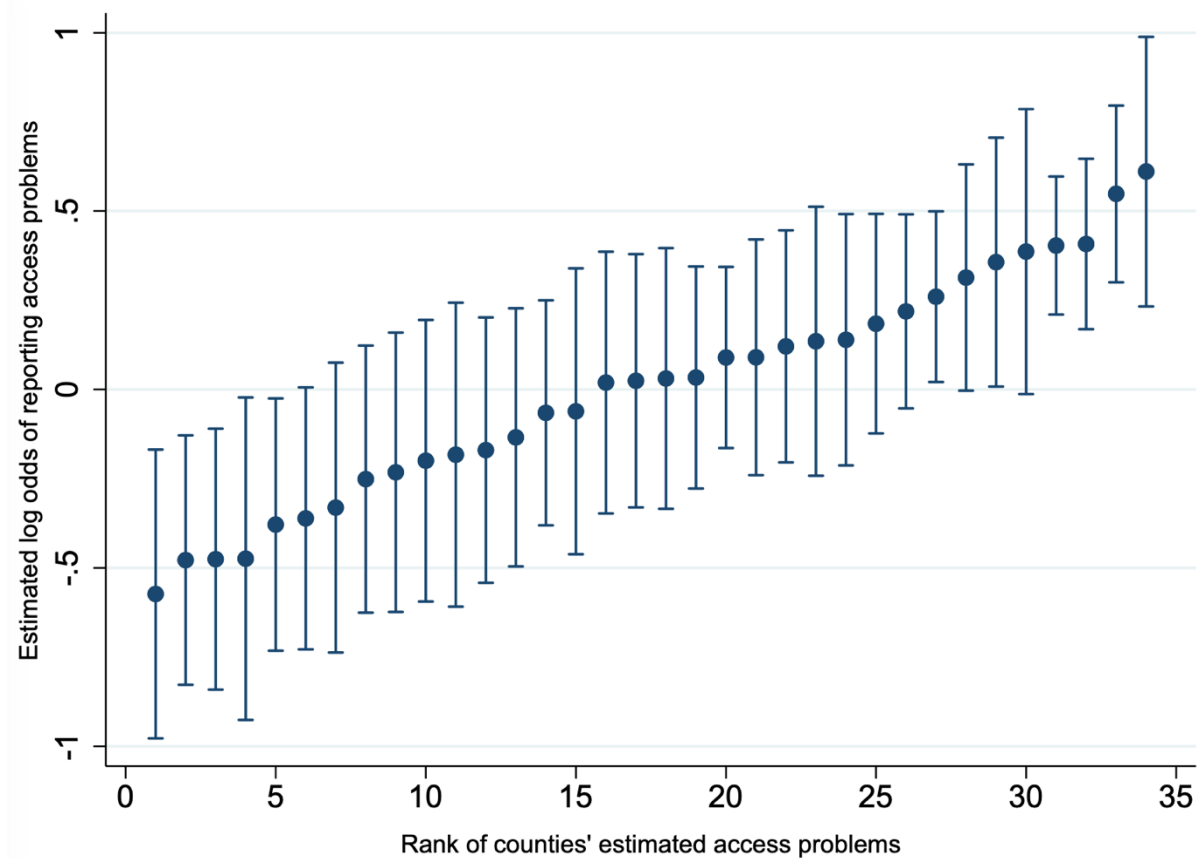
Note: Y-axis shows the log odds of reporting access problems relative to the average of the sample as a whole (zero is the overall average). Log odds can be thought of as similar to probabilities. The error bars are 95% confidence intervals.

In the county with the highest rate of reported difficulties, 16% of participants, on average, reported that the difficulties accessing a GP were a 'big problem' for them, whereas in the county with the lowest rate the average rate was 6%. Overall, county-level disparities accounted for 3.7% of the total variation. These differences were not accounted for by county-level deprivation indices but were associated with rurality (with primary caregivers from rural areas reporting fewer access problems on average [7%] than those in urban areas [10%]). The distribution of access difficulties was also related to English region, with the lowest average rates in Yorkshire and Humber and the North East (2% and 3% respectively, and the highest in East of England (7%). See Appendix 14 for full details.

6.2.4 Child and family services

6.2.4.1 Baby Classes

A total of 38% of primary caregivers reported using baby classes, such as baby massage classes, baby yoga groups, baby swimming classes, signing groups or sensory groups. On average, primary caregivers used baby classes 8 times (SD = 3) since their child was born. A third of all primary caregivers reported having attended baby classes more than 10 times since their baby was born and 30% (of all primary caregivers) said they had paid for all of these classes (with an additional 2% saying they paid some of the classes).

6.2.4.2 Playgroups and play sessions

Thirty-seven percent of primary caregivers reported using playgroups or play sessions, such as stay and play groups, one o'clock clubs, baby singing groups, and messy play groups. On average, primary caregivers used play groups and/or play sessions 8 times (SD = 3) since their child was born. Just over a quarter of primary caregivers (26%) reported having had play sessions more than 10 times since the baby was born and 21% of primary caregivers said they had paid for all the sessions (with a further 4% having paid for some of the sessions).

6.2.4.3 Breastfeeding support

Twenty-six percent of primary caregivers reported using breastfeeding support. On average, primary caregivers used breastfeeding support once (SD = 2) since their child was born. Just over a quarter of primary caregivers (26%) used breastfeeding support between 1 to 3 times and 12% of primary caregivers said they had paid for it (with a further 1% having paid for some of the sessions).

6.2.5 Family hub and children's centre usage

Primary caregivers were asked whether they had any help or support from a local children's centre, family hub, children and family centre or family centre. Family hubs and children's centres are designed to be 'one stop shops' that make it easier for families to get the support they need. At the time of data collection in 2022, 75 local authorities had been selected for funding to create family hubs by March 2025 with an additional 12 involved in development of the provision. Results below include all areas and are not restricted to these 87 authorities, nor to locations where family hubs or children's centres were available at the time of the survey.

Fifteen percent of primary caregivers said they had used a service offered by a family hub or children's centre since their baby was born in autumn 2021, half of whom (7% of the total sample) accessed a family hub or children's centre for more than one service. The services most frequently accessed through a family hub or children's centre were: playgroups or play sessions, health visitors, baby classes, breastfeeding support, and support/check-ups for infant weight and growth. All other services accessed through a family hub or children's centre were accessed by fewer than 1.5% of families.

Table 10 displays the percentage of people accessing each service via a family hub or children's centre out of all participants in the sample as a whole and out of those who accessed each service.

Table 10. Percentage of services accessed via family hubs (FH) or children's centres

Service	Percentage of all respondents accessing service through FH/centre (%)	Percentage of those who used each professional/service accessing through FH/centre (%)
Playgroup or play sessions	4	12
Health visitor	4	4
Baby Classes	3	9
Breastfeeding Support	2	9
Infant weight and growth	2	15
Midwife	1	2
Infant feeding support/weaning/nutrition	1	11
Baby and infant health advice and support	<1	15
Family Support Worker / Early Help Worker	<1	17
Mental health support	<1	4
Parenting support/parenting classes	<1	15
Infant sleep support	<1	7
Family relationships support	<1	6
Money or debt advice and support	<1	6
Housing advice and support	<1	4
Drug and alcohol support	<1	20
Advice and services for my child's disability or learning needs	<1	2
Jobs and training advice and support	0	0
Other	<1	8
Unweighted Base	*8560*	*****
Weighted Base	*8547*	*****

Base: All respondents; of those who used the service[24]   Source: COT20s wave 1
Table shows column %

---

[24] See Appendix 15 for individual weighted and unweighted bases for the 'percentage of those who used each professional/service accessing through FH/centre (%) column'.

6.2.5.1 Demographic differences in the use of a family hub or children's centre

Patterns of access to family hubs or children's centres varied by family income, primary caregiver education and ethnicity, and between single and couple parent/carer households, as displayed in Figure 28.

Figure 28. Accessing services through a family hub or children's centre by demographic characteristics
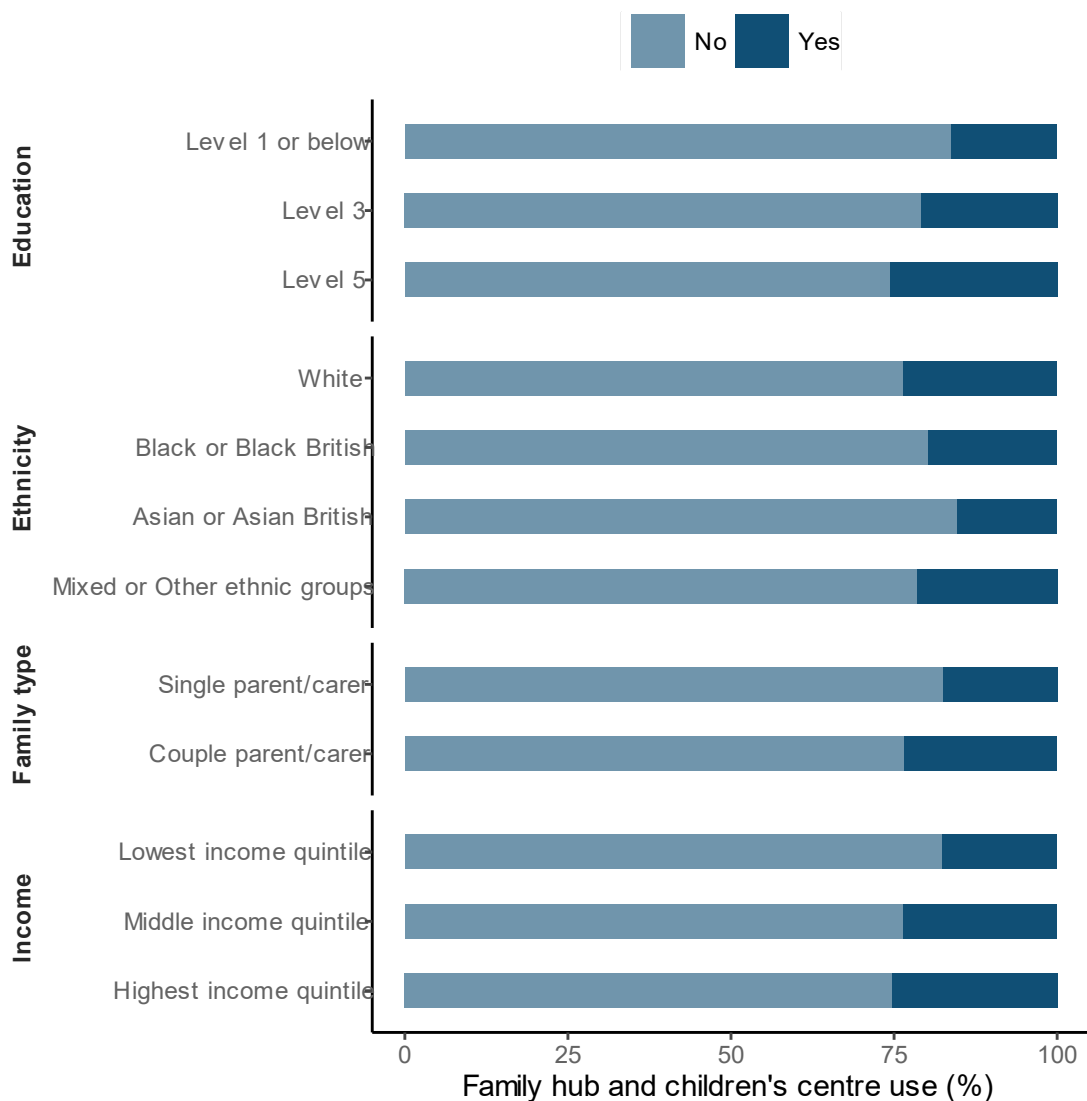
Base: All primary caregivers.   Source: COT20s wave 1

A multivariate analysis was conducted to determine whether primary caregiver education level, family income, ethnicity or family type were independently associated with the use of family hubs or children's centre. This analysis tested the independent effect of each demographic factor while controlling for the effect of the other demographics in the analysis. Findings indicated that family income, primary caregiver education level, and ethnicity were each associated independently (over and above the association of other

demographic characteristics added to the analysis) with the use of family hubs or children's centre.

The multivariate analysis indicated that families with higher incomes were more likely to report accessing services through a family hub or children's centre compared to those of lower income families. To illustrate, 18% of families in the lowest family income quintile reported having used a family hub or children's centre, compared to 25% of families in the highest family income quintile.

Analysis also showed that primary caregivers with higher education levels were more likely to report accessing services through a family hub or children's centre compared to those with lower education levels. Of those with the lowest education level, 16% reported using a family hub or children's centre compared to 26% with the highest education level.

Additionally, the multivariate analysis showed that families with a primary caregiver of Asian or Asian British ethnicity were less likely to report using a family hub or children's centre to access a service compared to those families with a primary caregiver of White ethnicity, as indicated by 15% of families with a primary caregiver of Asian or Asian British ethnicity accessing family hubs or children's centre compared to 24% of those with White ethnicity.

6.3 Summary

The period from conception to age two is critical for long-term health and wellbeing. The services and professional available to families in this period play an important part in promoting and supporting the health and well-being of children and families. Between birth and age 9.5 months, health visitors (97%), midwives (88%), and general practitioners (GPs; 87%) were the professionals most commonly consulted by families. Demographic differences affected access to health visitors and GPs. Primary caregivers with higher levels of education and/or who were single parents/carers reported more difficulty accessing health visitors, and primary caregivers of White ethnicity reported more difficulties compared to those of Black or Black British ethnicity. Considering difficulties in accessing GP, lower-income families reported more difficulties compared to those with higher levels of income.

Families also used many child and family services such as baby classes (38%), playgroups (37%), and breastfeeding support (26%) between birth and age 9.5 months, while 36% of families used none of the services listed in the survey. 32% of primary caregivers had paid to attend baby classes and 13% had paid for breastfeeding support.

Fifteen percent of families reported using a family hub or children's centre to access services between birth and age 9.5 months, of which half had used a family hub or children's centre to access more than one service. Families with higher income and with primary caregivers with higher levels of education were more likely to report using family

hubs and children's centres compared to those with lower income and lower levels of education. Additionally, primary caregivers with Asian or Asian British ethnicity were less likely to report using family hubs or children's centres than primary caregivers of a White ethnic background.

The findings demonstrate some variability in contact with professionals and, particularly, child and family services. As the COT20s study progresses, it will be possible to analyse whether this variation has any association with children's health and wellbeing in the long term. The findings highlight relatively low rates of usage of family hubs and children's centres by families in the first 9.5 months, which may be expected to increase as family hubs transformation plans are implemented within the local authorities in the programme.

7 Discussion and conclusions

Summary

- This report provides a descriptive profile of the COT20s cohort at the first wave of the study, at around 9.5 months of age, and presents initial findings from data collected from 8,628 families and their 8,733 children born in September, October, and November 2021.
- Comparisons of the cohort baseline profile to Census 2021 data supported the representativeness of the COT20s sample with respect to national statistics, though, as expected, the use of the Child Benefits Register as the sampling frame means that higher income families were under-represented to some extent.
- Forty-one percent of the cohort children and 57% of either of their parents/carers were exposed to COVID-19 infections. Fourteen percent of children were exposed to COVID-19 during pregnancy.
- Being a single parent/carer and having a lower family income were both independently associated with higher risks for clinically significant levels of anxiety and depression, and higher levels of loneliness, poorer general health, and pre-term birth and poorer health in their children. These factors are all known to be negatively associated with children's outcomes.
- Initial findings from the COT20s suggest that babies receive a variety of stimulating activities and experiences in the home, which positively impacted early language development. However, socio-economic disparities in the amount of stimulating home activities and interactions were already apparent in the first year of life.
- Findings from COT20s indicate families with young children rely more on informal childcare arrangements, particularly on grandparents' support, with significant variation in the use of formal ECEC.
- There were high rates of contact with professionals supporting families with babies, with some indication that services were not always reaching the families in need for which they had been designed. Families most at risk of disadvantage accessed a family hub or children's centre less frequently and reported higher difficulties in accessing key professionals such as GPs.
- The second wave of COT20s is launching in October 2023 when the cohort children reach age 2, and data collection will continue annually until the children are aged 5.

7.1   Discussion

7.1.1 Aim of the study and the report

The COT20s study is the first nationally representative birth cohort in England in two decades, during which time significant societal changes have occurred that are likely to impact families and early childhood development in significant ways. This report provides a descriptive profile of the COT20s cohort at the first wave of the study, at around 9 months of age, and presents initial findings from data collected at this point from 8,628 families and their 8,733 children born in September, October, and November 2021. This first survey marks the beginning of a five-year research process, which will involve the collection of data on a broad range of topics, including family finances, child and parental health, family relationships and support, parenting and children's cognitive, social and emotional development. The high rates of parental consent for linkage to education and health records will further enhance the potential for scientific and policy insights.

Growing awareness of the importance of early childhood has led to increased attention and investment in related policies over the past two decades. Initiatives such as the Sure Start children's centres, the Family Hubs and Start for Life programme, alongside the provision of universal early education and care for 3 and 4-year-olds and the Spring Budget 2023 childcare expansion, are key examples of policies designed in part to promote young children's health or development. COT20s aims to respond to the need for early years policies to keep pace with the significant changes in the lives of young children and their families in recent years (Batcheler et al., 2022), including the consequences of the COVID-19 pandemic. The goal is to understand the key factors influencing children's development in the 2020s and to generate evidence that can be used to inform the optimal allocation and deployment of resources and services, and to develop new policies and interventions for the early years.

The first COT20s survey, at age 9 months, aimed to create a comprehensive baseline of data for researchers and policy makers for future longitudinal analysis. The survey was designed to be harmonised as far as possible with past cohorts, particularly the Millennium Cohort Study (MCS) and the Study of Early Education and Development (SEED), and to measure important new features of the evolving landscape of early childhood, including the increasing diversity of family forms and the presence of digital technology in homes. It is the first birth cohort study in England since the COVID-19 pandemic, during which time many of the cohort children and their families were affected by COVID-19 infections during pregnancy and after birth. All were likely affected to some degree by the reduced social interactions and limited opportunities that characterised even this later stage of the pandemic. The study is also well placed to address the impacts on children of the societal and economic consequences of the COVID-19 pandemic and the economic challenges of the increasing cost of living.

This report describes the overall profile of the families taking part in the COT20s study to orientate data users to the kinds of questions it will be able to address in the coming years, to consider the representativeness of the sampling, and to highlight some key cross-sectional findings relating to children's family circumstances, the health and wellbeing of their primary caregivers, the home environment and children's early language development. It also reports on the types of early childhood education and care provision and the range of services used by families. Further, the baseline survey of COT20s allowed exploration of some key socio-economic and demographic comparisons that provide indications of disparities. The report examined relationships between family income, family type, and primary caregiver's educational level and ethnicity and children's health and developmental outcomes, primary caregiver's health and wellbeing, the home learning environment, access to early childhood education and care and use of services.

7.1.2 Representativeness and potential participation biases

A key consideration in reviewing the data from the first survey of COT20s is the extent to which the sample is nationally representative. Details of the sampling design are provided in the technical report, and all findings described in this report are adjusted with sample weights. Although the response rate was higher than projected (at 51%) and the data were weighted to account for non-response, the demographic profile of the COT20s cohort was compared with external data sources, mainly Census 2021, for an assessment of potential participation bias and to obtain some indication of the representativeness of the cohort. Broadly speaking, these comparisons tended to affirm the representativeness of the COT20s cohort with respect to the population of England, with some exceptions. It was expected that the COT20s study would not be fully representative of families' financial circumstances, because its use of the Child Benefits Register as the sampling frame meant that higher income families (those earning above £100,000 per year) were under-represented. This tendency will likely be offset to some modest degree by an expected higher response rate among higher-income families. There was also some evidence that the sample may, to a small degree, over-represent cohort children of White ethnicity. However, on most demographic indicators, the COT20s study cohort closely matched recent national population estimates.

7.1.2.1 Cross-cohort comparisons and generational trends

The Nuffield Foundation's Changing Face of Early Childhood Series has highlighted a wide array of social changes that have taken place in family life in the last 20 years (Batcheler et al., 2022), including increases in the number of children born to parents not living together, increases in parental mental ill-health and stress, increases in children growing up in relative poverty, and dramatic increases in access to digital media. It is interesting to consider the initial results from the first survey of COT20s from that perspective and consider how key family variables have changed since the last nationally representative studies were conducted in England and the UK.

7.1.2.2 Primary caregiver gender and age

Although the primary caregivers in COT20s were mainly biological mothers (92%), this reflects a lower proportion than was seen in the first sweep of the Millennium Cohort Study (2000-2002), where 99.8% of main respondents were the cohort child's biological mother. As the Nuffield report notes, labour market participation by mothers has changed more substantially than has the division of labour with respect to childcare. The COT20s study finds that in 7.4% of families the child's biological father is their main caregiver at age 9.5 months (compared to 0.11% in MCS).

The age of primary caregivers in the COT20s study (32 years on average) is consistent with national statistics and aligns with an ongoing trend of children being born to older parents compared to previous generations (30% of primary caregivers were aged 35 years or above). The study also included comparatively few teenaged parents, which is also consistent with recent trends (less than 1% of primary caregivers in the study were younger than 20 years). Between 2011 and 2021, conception rates increased only among women aged 35 years and over, while the conception rate for women aged under 18 years had more than halved (ONS, 2023). These may be viewed as positive trends from the point of view of child development, as combined evidence from the MCS and the National Evaluation of Sure Start study suggest increased parental age may positively impact children's health, for example as indicated by lower rates of unintentional injuries, hospital admissions, and higher rates of immunisations. Higher parental age is also associated with better language development and fewer social and emotional difficulties up to 5 years of age (Sutcliffe et al. 2012).

7.1.2.3 Family composition

The COT20s protocol allows the capture of diverse patterns of family composition, making it possible to explore relationships between diverse family structures and children's outcomes and to compare family structures with previous cohorts. Most cohort children (81%) lived in households with two parents/carers and approximately 1 in 5 belonged to lone-parent households. Most lone-parents were mothers and less than 1% were same-sex cohabiting couple families. A proportion of children (14%) had regular contact with a parent who resided elsewhere, and in most cases (97%) these were fathers. A small proportion of all primary caregivers (6%) were in a relationship with the cohort child's other parent but were not living in the same household.

Consistent with trends noted in the Nuffield report (Batcheler et al., 2022), although in COT20s the majority (53%) of primary caregivers were married or in a civil partnership with their resident partner, the proportion has decreased over time. For example, 71% of parents reported being married in the first sweep of the MCS in England. The overall proportion of MCS families reporting two resident parents (85%) is only marginally higher than that observed in 2022 in the COT20s study (81%), suggesting an increase in the number of cohabiting (but unmarried) couple families and a decrease in married couple

families, which is consistent with population statistics (ONS, 2023). In general, marriage does not seem to be linked to children's outcomes once the characteristics of the different types of families who choose to get married are accounted for, as indicated by analyses of family structures in the MCS (Goodman and Greaves, 2010) and the Avon Longitudinal Study of Parents and Children (Crawford et al., 2013). Changing family structures are nevertheless important features of children's environments and the study will collect data on family structure over time, so that continuity and change can be measured and evaluated, including separations, re-partnering, parents residing elsewhere, and blended families. It will also continue to examine differences in lone-parent families compared to couple families. This first survey provides some important initial evidence for differences in single parents/carers' experiences compared to couple parent/carers, which included: higher levels of loneliness and isolation (8% vs 4 % feeling often/always lonely); higher risk of anxiety and depression (9% vs 4% scoring above the clinical level thresholds); poorer general health (29% vs 39% in very good health) and child's health (74% vs 80% reported very good health for their child). The heightened economic and psychological stress experienced by single parents/carers is likely to place their children at greater risk of poorer outcomes, and as such they may benefit from greater policy support.

7.1.2.4 Education

The average level of education among primary caregivers is higher than in previous cohorts. Fifty percent of primary caregivers in COT20s had an equivalised qualification at level 4 or above, (which included educational qualifications at or above degree level and NVQ level 4 and 5), while 8% had no qualifications. In the MCS, the proportions of mothers with equivalised qualifications at level 4 or above reported for England was considerably lower (33%) than in COT20s, and that of mothers with no qualifications higher (12%). It is noticeable that 19% of primary caregivers in COT20s had an equivalised qualification at level 5 (postgraduate level), compared to only 4% of mothers in England in the MCS. The increase in qualification levels amongst parents of young children is aligned with changes reported in the general population (ONS, 2023). The widely documented positive effect of higher parental education on children's outcomes (e.g. in MCS: Cattan et al., 2022) suggests that these rising trends should benefit children over time, and cross-cohort comparisons could make it possible to test this empirically in future.

7.1.2.5 Employment and Finances

There was high labour market engagement among primary caregivers, as over two-thirds of primary caregivers were employed (65%) or self-employed (6%). The employment rate of primary caregivers was markedly higher than that of mothers in England in the MCS, where 51% reported being in paid work or on leave from a paid job. Although COT20s includes 7% of fathers as primary caregivers, who in the MCS had much higher employment rates than mothers, these proportions are consistent with other reports

which highlight significant changes in maternal employment patterns over the last two decades. These shifts are mirrored by changes in parental leave: in COT20s, 68% of primary caregivers had taken parental leave, which included 32% who were on parental leave at the time of the survey (when the cohort children were aged 9.5 months on average). In the MCS, 54% of mothers in England had taken leave and only 2.5 % were on leave from a paid job when their baby was 9 months of age, indicating that primary caregivers are now more likely to take parental leave from paid work and to do so for longer considering policy changes regarding parental leave over the past 20 years (see differences Atkinson et al., 2022; Moss & O'Brien, 2005). It was also notable that rates of home ownership were 14 percentage points lower among COT20s families than families in England in MCS (50% in COT20s compared with 64% in MCS). These are significant changes in the first years of family life, and the intersection between family life and work may change more rapidly in future, as more workers, who may be parents, are employed on flexible or zero-hours contracts (Mutebi & Hobbs, 2022; Clark, 2023), and as remote working becomes increasingly common, in part as a result of the COVID-19 pandemic and the rapid expansion of digital tools for remote working. These changes may be accelerated, and/or their effects on children accentuated, by increasing financial pressures on households in the coming years.

7.1.2.6 Financial hardship and socio-economic disparities

Wave 1 of the COT20s study found evidence of financial hardship among parents with babies in England, with a quarter (25%) of families facing at least one of the following financial strains: having difficulties managing finances, not keeping up with bills, being unable to afford essential baby items, and having to skip or cut the size of meals due to lack of money. Furthermore, in line with the conclusions of the IFS Deaton Review (Cattan et al., 2022), family income was consistently linked to disparities in other important family factors known to be linked to children's outcomes. For example, consistent with numerous other studies, COT20s found that children in low-income families were more likely to have had low birth weight and to be in poor health. Thirteen percent of children in the lowest income quintile were born with low birth weight (defined as below 2500g) compared with 5% in the highest income quintile, while 5% of children in the lowest income quintile were reported to be in fair, bad or very bad health compared with 1% in the highest income quintile. Primary caregivers in the lowest family income quintile had higher rates of risk for anxiety and depression compared to those in the highest family income quintile (19% vs 3% scoring above the threshold for risk of depression), reported higher levels of loneliness (7% vs 2% often/always feeling lonely) and had poorer general health (27% vs 10% reported their health to be 'fair', 'bad' or 'very bad). These findings add to the existing evidence that income is associated with inequalities in family wellbeing and children's outcomes. Longitudinal studies can provide information on how continuity and change in financial circumstances affect parental wellbeing and children's health and development and can produce evidence on the mediating factors that increase the likelihood of poor outcomes, and the moderating

factors that can mitigate them. This evidence will be important in the coming years if cost of living pressures begin to draw new portions of the population into financial hardship. At each subsequent wave of data collection, the COT20s study will capture longitudinal patterns of employment, family income and financial difficulties, alongside key mediating and moderating variables, in order to gain a deeper understanding of the relationship between economic insecurity and children's outcomes.

7.1.2.7 The home learning environment and children's development

A key focus of the COT20s study is the role played by the home context and family processes in influencing children's social, emotional, and cognitive outcomes. Data from the first survey of COT20s suggests that babies in England typically receive a variety of stimulating activities and experiences in the home. Primary caregivers engaged frequently in a range of activities with their babies, including visiting outdoor, green and natural spaces, engaging in pretend games, singing, turn taking games, playing with toys and physical play and, to a lesser extent, reading and looking at pictures in books. However, it was notable that these important early experiences showed evidence of socio-economic disparities. Children in lower income families were exposed to stimulating activities less frequently that those in higher income families, were likely to have spent longer watching videos or other digital content on a screen and were less likely to visit outdoor and green spaces. Socio-economic differences in the home learning environment were also identified in SEED at 2 years of age, with children in families who were most disadvantaged being exposed to a less stimulating learning environment than those in the least disadvantaged families (Speight et al., 2015). The data from the first wave of the COT20s study show that these disparities are already apparent in the first year of life.

As expected, the frequency of home learning activities was associated with the cohort children's early language abilities. Those who were more frequently exposed to stimulating activities and interactions, such as being read to, turn-taking games, and pretend games, were, on average, reported to understand more words. Although early language changes very rapidly between the first and the third year of age, these findings support much previous, generally smaller scale, research in indicating that stimulating home activities are likely to have important developmental effects in the first year of life. A critical issue is whether these associations are causal, and longitudinal cohort studies can provide valuable evidence from which to make causal inferences. The annual pattern of data collection and the enhancement of data collection using the BabySteps smartphone app (allowing additional data collection between annual waves) will provide a particularly rich resource for looking at potential causal mechanisms.

Importantly, this first survey highlighted that language development of children at 9.5 months was comparable to that measured in children prior to the COVID-19 pandemic (CDI-UK). While this finding is important and reassuring, it is possible that the different environments experienced by babies and families during the later stages of the COVID-

19 pandemic may nevertheless have affected other outcomes or may manifest at later stages of development.

Finally, a significant finding of this first survey is that 9.5-month-old children spend an average of 29 minutes watching television, videos or other digital content on a screen per day. Seventy two percent of COT20s children watched some amount of digital content, and 7% watched for over 2 hours per day. Although screen time was not found to be associated with language development at 9 months, there is some evidence from other studies that high levels of screen time may be associated with, and could potentially cause, poor health outcomes in young children, such as overweight/obesity and poor sleep, as well as poorer behavioural and developmental outcomes (Li et al., 2021). However, the evidence on this topic is inconclusive and more research is needed. The COT20s study will be a valuable resource for addressing the effects of screen time on children's outcomes in the coming years.

7.1.2.8 Early Childhood Education and Care (ECEC)

The COT20s cohort will provide valuable evidence regarding the use of formal and informal ECEC provision among families with young children in England.

At this first wave of the study, when the COT20s babies were only on average 9.5 months of age, more than half of families (57%) reported having not yet used any ECEC provision for the cohort child; over a third (37%) had used informal ECEC, and approximately one in eight (13%) had used formal ECEC.

Thirteen percent of families reported having used formal ECEC provision on a regular basis, mostly in day nurseries (6%), nursery schools (3%) or with childminders (3%), for an average of 18 hours a week, with an average age of entry at 8 months. The percentage of children receiving formal provision is comparable to that reported in the Childcare and Early Years Survey of Parents (CEYSP) 2019 study, where 11% had used formal ECEC for a child younger than 12 months (DfE, 2019). In both CEYSP (2019) and SEED (2013) group-based formal ECEC (such as nurseries) was more commonly used than individual formal provision (such as childminders). However, there were important differences in the socio-economic and demographic characteristics of those who used formal ECEC. Children in families with higher incomes and whose primary caregiver had higher educational levels were more likely to experience formal ECEC provision (23% of those in the highest family income quintile vs only 4% of those in the lowest quintile). Parents/carers with these demographic characteristics are more likely to be able to afford higher prices and may also be working more hours. The CEYSP study highlighted that the costs of formal childcare are highest for younger children, with a median of £90 (and an average exceeding £120) a week spent by families with a 1-year-old in 2019, which was double the amount spent by families with a 2-year-old (Farquharson & Olorenshaw, 2022). This cost of formal childcare provision for families with young children may partly

explain the much higher rates of informal childcare arrangements (by relatives or friends) as a more affordable alternative, particularly for families facing financial constraints

Informal ECEC was used regularly by 37% of families and was mostly provided by grandparents (in 34% of all families, and in 94% of those using informal ECEC). Those children who were regularly cared for by grandparents had received an average of 12 hours a week since the age of 5 months. This indicates that during the first 9 months of children's lives the most common type of childcare families rely on is that provided by grandparents. The proportion of grandparents providing childcare in COT20s families is higher than the 22% for 0 to 1-year-olds in the CEYSP (DfE, 2019), which suggests care by grandparents in the first year of life may have increased since the COVID-19 pandemic. It has been suggested that the role grandparents play in raising young children needs to be investigated further and considered in family policies (Buchanan and Rotkirch, 2018). Further, data from the third sweep of the MCS revealed the important role grandparents' support played in the participation of mothers in the labour market, allowing both lone and coupled mothers to enter paid employment regardless of their educational levels (Kanji, 2018). The support provided by grandparents may be crucial for parents/carers who require childcare outside standard hours or in irregular patterns. The COT20s study found that single parent/carer families were less likely to access formal ECEC, but were more likely to use informal ECEC than coupled families. This suggests that single parents may need to access formal childcare services even though, crucially, these families tend to have fewer financial resources to afford such provision.

Obtaining good contemporary evidence on the role of early childhood education and care settings in family life and in children's outcomes is a key objective of the COT20s study. Future waves will not only capture use of ECEC provision in each inter-wave period and the take up of available government support programmes, but also measure key structural and quality indicators of formal ECEC provision at 3 and 4 years of age.

7.1.2.9 Service Use

Families taking part in the COT20s study reported having high rates of contact with universal healthcare provision from professionals supporting families with babies, despite some of the challenges that such services had faced during the COVID-19 pandemic. Since the birth of their child almost all had seen a health visitor (97%), and a high proportion had seen a midwife (88%), and a GP (87%). On average, primary caregivers had seen any professionals on 3 occasions since their baby was born. Fewer than 1% reported no contact with professionals, although approximately one in four (24%) and one in five primary caregivers (19%) reported having difficulties accessing a GP or a health visitor, respectively. There was some indication that these access problems differed between geographical locations and family socio-economic circumstances. Problems accessing a health visitor tended to be experienced more frequently by primary caregivers with higher levels of education, which may reflect the targeted support health visitors offer for families with greater need. On average, problems with accessing health

visitor support were more common in the West Midlands and the South West (although the differences were small), and these differences did not appear to be related to rurality or county-level indices of deprivation. A quarter of primary caregivers (24%) reported difficulties accessing a GP. While families with lower income were slightly more likely to have experienced problems accessing a GP, the largest variation in access to a GP was by geography with more problems reported in urban areas compared to rural ones, and fewer problems reported in Yorkshire and Humber and the North East compared to other regions of England.

A range of other child and family services were accessed by families, most frequently baby classes (38%), playgroups (37%), and breastfeeding support (26%). However, many primary caregivers reported having paid for these services, especially baby classes and playgroups, rather than being provided free of charge.

Fifteen percent of primary caregivers reported having used a service offered by a family hubs and children's centre and half accessed a family hub or centre for more than one service. These percentages likely reflect the early stages of roll-out of family hubs and the closure of children's centres in many local areas. There are expected to be rapid changes in the coming years as the family hubs transformation programmes develop. There were some differences in the demographics of families who reported accessing a family hub or children's centre. Primary caregivers with higher family incomes, higher educational levels and of White ethnicity reported accessing family hubs or children's centres on average more frequently than those with lower family income or education, and those of Asian or Asian British ethnicity. It will be important to examine this in more depth as the Family Hubs and Start for Life programme evolves, both within the COT20s study and from direct service data.

Next steps for COT20s

The first wave of COT20s launched in 2022 and slightly exceeded its recruitment and response rate targets, collecting rich data on families' circumstances when their child was around 9 months of age. The coming months and years will see much activity to build a rich longitudinal data resource. In the first instance, COT20s will share the data collected in this first survey of primary caregivers with the wider community of researchers through the ONS Secure Research Service. The documentation will include not only the data related to the information presented in this report, but also a range of additional variables that were not analysed as part of this report.

Secondly, the child's other parent (both if residing in the household or elsewhere), or, if relevant, the primary caregiver's cohabiting partner, was invited to participate in a 30-minute online survey. The survey asked similar questions to those asked to primary caregivers, including parental health and wellbeing, background and finances, parent-infant relationship, and work-life balance. Data were collected for 24% of all eligible

parents or partners. These data will also be shared via the ONS Secure Research Service.

Primary caregivers, and non-primary caregivers who completed the online survey, were also invited to download the BabySteps App, which is a free smartphone app designed for the COT20s study. A large proportion of primary caregivers registered on the app, 74% in total. BabySteps has been used both as a participant engagement tool and to collect data through monthly research activities. Between the first and second wave of data collection, fifteen mini surveys were released in the app and completed by up to 75% of primary caregivers who are registered in the app. These data will also be shared via the ONS Secure Research Service in future and linked to the main survey data.

The second wave of data collection for COT20s was launched in October 2023, when the children started turning 2 years old. Primary caregivers who participated in the first wave of data collection were initially invited to complete a 30-minute online survey, and if not responding are later asked to complete a telephone interview. The wave 2 survey includes an update on topics covered in the first wave, such as language development, parental wellbeing, employment, finances, and the home learning environment, but also measures new domains such as parent-child relationship and socio-emotional development. Non-primary informants (either those who participated at wave 1 or parents/partners identified through the wave 2 primary informant interview) will be invited to complete a shorter 20-minutes survey on similar topics. Monthly mini surveys will continue to be released through the BabySteps app focusing on measures of child's development.

The planning for the third wave of data collection is ongoing and will be launched in November 2024, when the children will turn 3 years and 2 months. This will be a face-to-face interview of up to 90 minutes that will include a survey with the primary informant (parent/carer) and direct assessments of children's cognitive ability.

References

Agalioti-Sgompou, V., Atkinson, M., Church, D., Johnson, J., Mostafa, T., Murphy, T., Peters, A., & Rosenberg, R. (2017). *MCS6 Derived Variables: User guide.* https://cls.ucl.ac.uk/wp-content/uploads/2018/08/mcs6_derived_variables_user_guide_1sted_2017.pdf

Alcock, K. (2020). *The UK communicative development inventory database: words and gestures ages 8-18 months 2012-2016* [data collection]. UK Data Service. SN: 853687. https://doi.org/10.5255/UKDA-SN-853687

Atkinson J., O'Brien, M. and Koslowski, A. (2022). United Kingdom country note. In A. Koslowski, S. Blum, I. Dobrotić, G. Kaufman, & P. Moss (Eds.), *International review of leave policies and research 2022.* FernUniversität in Hagen. http://www.leavenetwork.org/lp_and_r_reports/

Baker, M. (2011). Innis lecture: Universal early childhood interventions. *Canadian Journal of Economics, 44*(4), 1069–1105. https://doi.org/10.1111/j.1540-5982.2011.01668.x

Bangham, G., Clarke, S., Gardiner, L., Judge, L., Rahman, F., & Tomlinson, D. (2019). *An Intergenerational Audit for the UK: 2019*. Resolution Foundation. https://www.resolutionfoundation.org/app/uploads/2019/06/Intergenerational-audit-for-the-UK.pdf

Barnett, W. S. (2008). *Preschool education and its lasting effects: Research and policy implications.* Boulder and Tempe: Education and the Public Interest Center & Education Policy Research Unit. http://epicpolicy.org/publication/preschooleducation

Batcheler, R., Ireland, E., Oppenheim, C., & Rehill, J. (2022). *Time for parents: The changing face of early childhood in the UK.* Nuffield Foundation. https://www.nuffieldfoundation.org/wp-content/uploads/2022/05/Time-for-parents-Nuffield-Foundation.pdf

Batty, G. D., Ploubidis, G. B., Goodman, A., & Bann, D. (2018). Association of nursery and early school attendance with later health behaviours, biomedical risk factors, and mortality: Evidence from four decades of follow-up of participants in the 1958 birth cohort study. *Journal of Epidemiology and Community Health, 72*, 658–663. https://doi.org/10.1136/jech-2018-210667

Berry, J. O., & Jones, W. H. (1995). The Parental Stress Scale: Initial psychometric evidence. *Journal of Social and Personal Relationships, 12*(3), 463–472. https://doi.org/10.1177/0265407595123009

Blanden, J., Del Bono, E., McNally, S., & Rabe, B. (2016), Universal pre-school education: The case of public funding with private provision. *Economic Journal, 126(*592), 682–723. https://doi.org/10.1111/ecoj.12374

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371–399. https://doi.org/10.1146/annurev.psych.53.100901.135233

Buchanan, A., & Rotkirch, A. (2018). Twenty-first century grandparents: Global

perspectives on changing roles and consequences. *Contemporary Social Science, 13*, 131–144. https://doi.org/10.1080/ 21582041.2018.1467034

Bynner, J., & Joshi, H. (2007). Building the evidence base from longitudinal data: The aims, content and achievements of the British birth cohort studies. *Innovation, 20*(2), 159–179, https://doi.org/10.1080/13511610701502255

Caicedo, C. (2014). Families with special needs children: Family health, functioning, and care burden. *Journal of the American Psychiatric Nurses Association*, *20*(6), 398–407. https://doi.org/10.1177/1078390314561326

Cattan, S., Fitzsimons, E., Goodman, A., Phimister, A., Ploubidis, G. B., & Wertz, J. (2022). *Early childhood and inequalities*. IFS Deaton Review of Inequalities, https://ifs.org.uk/inequality/early-childhood-inequalities-chapter

Center on the Developing Child at Harvard University. (2009). *Maternal depression can undermine the development of young children.* Center on the Developing Child at Harvard University. https://harvardcenter.wpenginepowered.com/wp-content/uploads/2009/05/Maternal-Depression-Can-Undermine-Development.pdf

Champaloux, S. W., & Young D. R. (2015). Childhood chronic health conditions and educational attainment: A social ecological approach. *Journal of Adolescent Health, 56*(1), 98–105. https://doi.org/10.1016/j.jadohealth.2014.07.016

Clark, D. (2023, 18 August). *Number of employees on a zero-hours contract in the United Kingdom from 2000 to 2023.* https://www.statista.com/statistics/414896/employees-with-zero-hours-contracts-number/ - :~:text=Number of employees on zero-hours contracts UK 2000-2023&text=In 2023 there were approximately,this type of employment contract

Crawford, C., Goodman, A., & Greaves, E. (2013). *Cohabitation, marriage, relationship stability and child outcomes: Final report.* Institute for Fiscal Studies. https://ifs.org.uk/sites/default/files/output_url_files/r87.pdf

Dadvand, P., Gascon, M., & Markevych, I. (2019). Green Spaces and child health and development. In Marselle, M., Stadler, J., Korn, H., Irvine, K., & Bonn, A. (Eds.), Biodiversity and Health in the Face of Climate Change (pp. 121–130). Springer. https://library.oapen.org/bitstream/handle/20.500.12657/22910/1/1007251.pdf#page=143

Dearden, L., Sibieta, L., & Sylva, K. (2011). The socio-economic gradient in early child outcomes: Evidence from the Millennium Cohort Study. *Longitudinal and Life Course Studies, 2,* 19–40. https://doi.org/10.14301/llcs.v2i1.140

Denault, A.-A., Cabrera, N. J., & Bureau, J.-F. (2022). A meta-analysis on observed paternal and maternal sensitivity. *Child Development, 93,* 1631–1648. https://doi.org/10.1111/cdev.13832

Department for Education (2015, 23 October). *Study of Early Education and Development (SEED): Research about the current childcare and early education model in England.* UK Government. https://www.gov.uk/government/collections/study-of-early-education-and-development-seed

Department for Education. (2019). *Survey of Childcare and Early Years Providers: Main Summary, England, 2019.*
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/854020/CEYSP_2019_tables.ods

Department for Education. (2023). *Education provision: Children under 5 years of age.* UK Government. https://explore-education-statistics.service.gov.uk/find-statistics/education-provision-children-under-5/2023#releaseHeadlines-tables

Department of Health and Social Care. (2021). *The Best Start for Life A Vision for the 1,001 Critical Days.* UK Government.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/973112/The_best_start_for_life_a_vision_for_the_1_001_critical_days.pdf

Department for Work and Pensions. (2021, 25 March). Household below average income series: Quality and methodology information report FYE 2020. UK Government. https://www.gov.uk/government/statistics/households-below-average-income-for-financial-years-ending-1995-to-2020/household-below-average-income-series-quality-and-methodology-information-report-fye-2020#equivalisation-1

Dex, S., & Joshi, H. (2004). *Millennium cohort study first survey: A user's guide to initial findings.* Institute of Education, University of London.
https://www.researchgate.net/publication/320194950_Millennium_Cohort_Study_First_Survey_A_User's_Guide_to_Initial_Findings

Elango, S., García, J., Heckman, J., & Hojman, A. (2016). Early childhood education. In R. A. Moffitt (Ed.), *Economics of means-tested transfer programs in the United States, Vol. 2. (pp.* 235–298). University of Chicago Press.
https://www.nber.org/system/files/chapters/c13489/c13489.pdf

Farquharson, C., & Olorenshaw, H. (2022). *The changing cost of childcare.* Institute for Fiscal Studies. https://ifs.org.uk/publications/changing-cost-childcare

Fellmeth, G., Harrison, S., Quigley, M. A., & Alderdice, F. (2022). A comparison of three measures to identify postnatal anxiety: Analysis of the 2020 national maternity survey in England. *International Journal of Environmental Research and Public Health, 19*(11). https://doi.org/10.3390/ijerph19116578

Goisis, A., Ozcan, B., & Myrskyla, M. (2007). Decline in the negative association between low birth weight and cognitive ability. P*roceedings of the National Academy of Sciences of the United States of America, 114*(1), 84–88.
https://doi.org/ 10.1073/pnas.1605544114

Goodman, A., & Greaves, E. (2010). *Cohabitation, marriage, relationship stability.* Institute for Fiscal Studies.
https://ifs.org.uk/sites/default/files/output_url_files/bn107.pdf

Goodman, A., & Sianesi, B. (2005). Early education and children's outcomes: How long do the impacts last? *Fiscal Studies, 26*, 513–548. https://doi.org/10.1111/j.1475-5890.2005.00022.x

Hagenaars, A. J. M., De Vos, K., & Zaidi, M. A. (1994). *Poverty statistics in the late*

1980s: Research based on micro-data. Office for Official Publications of the European Community. https://op.europa.eu/en/publication-detail/-/publication/9c787f17-acb6-4f4b-badc-49a2310e65f7

Hansen, K., & Hawkes, D. (2009). Early childcare and child development. *Journal of Social Policy, 38*(2), 211–239. https://doi.org/10.1017/S004727940800281X

Harrison, S., Quigley, M. A., Fellmeth, G., Stein, A., & Alderdice, F. (2023). The impact of the Covid-19 pandemic on postnatal depression: analysis of three population-based national maternity surveys in England (2014–2020). *The Lancet, 30.* *https://doi.org/10.1016/j.lanepe.2023.100654*

Hefferon, C., Taylor, C., Bennett, D., Falconer, C., Campbell, M., Williams, J.G., Schwartz, D., Kipping, R., & Taylor-Robinson, D. (2021). Priorities for the child public health response to the COVID-19 pandemic recovery in England. *Archives of Disease in Childhood, 106*, 533–538. https://doi.org/10.1136/archdischild-2020-320214

Institute for Government Analysis. (2022). *Timeline of UK government coronavirus lockdowns and restrictions: Key lockdowns and measure introduced during the Covid pandemic between March 2020 and December 2021.* https://www.instituteforgovernment.org.uk/sites/default/files/timeline-coronavirus-lockdown-december-2021.pdf

Ipsos & UCL (2023). Children of the 2020s Wave 1: Technical Report. ISBN: 978-1-83870-498-8

Ipsos MORI. (2020). *State of the nation: Understanding public attitudes to the early years.* The Royal Foundation. *https://royalfoundation.com/wp-content/uploads/2020/11/Ipsos-MORI-SON_report_FINAL_V2.4.pdf*

Islam, M. Z., Johnston, J., & Sly, P.D. (2020). Green space and early childhood development: a systematic review. *Reviews on Environment Health 35*, 189–200. https://doi.org/10.1515/reveh-2019-0046

Jimenez, M. P., Shoaff, J., Kioumourtzoglou, M. A., Korrick, S., Rifas-Shiman, S. L., Hivert, M. F., Oken, E., & James, P. (2022). Early-Life Exposure to Green Space and Mid-Childhood Cognition in the Project Viva Cohort, Massachusetts. *American Journal of Epidemiology, 191*(1), 115–125. https://doi.org/10.1093/aje/kwab209

Joshi, H., & Fitzsimons, E. (2016). The UK Millennium Cohort Study: The making of a multi-purpose resource for social science and policy in the UK. *Longitudinal and Life Course Studies, 7*(4), 409–430. https://doi.org/10.14301/llcs.v7i4.410

Kanji S. (2018) Grandparent care: a key factor in mothers' labour force participation in the UK. *Journal of Social Policy, 47*(3), 523–542. https://doi.org/10.1017/S004727941700071X

Kelly, Y., Sacker, A., Del Bono, E., Francesconi, F., & Marmot, M. (2011). What role for the home learning environment and parenting in reducing the socioeconomic gradient in child development? Findings from the Millennium Cohort Study. *Archives of Disease in Childhood*, *96*, 832–837. https://doi.org/10.1136/adc.2010.195917

Kiernan, K., Crossman, S., & Phimister, A. (2022). *Families and inequalities.*

IFS Deaton Review of Inequalities. Institute for Fiscal Studies. https://ifs.org.uk/inequality/wp-content/uploads/2022/06/IFS-Deaton-Review-Families-and-inequality-.pdf

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The patient health questionnaire-2: Validity of a two-item depression screener. *Medical Care, 41*, 1284-1292. https://doi.org/10.1097/01.MLR.0000093487.78664.3C

Kroenke, K., Spitzer, R. L., Williams, J. B., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine, 146*, 317-325. https://doi.org/10.7326/0003-4819-146-5-200703060-00004

Lai, E. T., Wickham, S., Law, C., Whitehead, M., Barr, B., & Taylor-Robinson, D. (2019). Poverty dynamics and health in late childhood in the UK: Evidence from the Millennium Cohort Study. *Archives of Disease in Childhood, 104*, 1049–1055. https://doi.org/10.1136/archdischild-2018-316702

Li, C., Cheng, G., Sha, T., Cheng, W., & Yan, Y. (2020). The relationships between screen use and health indicators among infants, toddlers, and preschoolers: A meta-analysis and systematic review. *International journal of environmental research and public health*, *17*(19), 7324. https://doi.org/10.3390/ijerph17197324

Louie, A. D., Cromer, L. D., & Berry, J. O. (2017). Assessing parenting stress: Review of the use and interpretation of the Parental Stress Scale. *The Family Journal, 25*(4), 359–367. https://doi.org/10.1177/1066480717731347

Ludvigsson, J. F. (2020). Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatrica, 109, 1088*–1095. https://doi.org/10.1111/apa.15270

Madigan, S., Prime, H., Graham, S., Rodrigues, M., Anderson, N., Khoury, J., & Jenkins, J. (2019). Parenting behavior and child language: A meta-analysis. *Pediatrics, 144.* https://doi.org/10.1542/peds.2018-3556

Melhuish, E., Ereky-Stevens, K., Petrogiannis, K., Ariescu, A., Penderi, E., Rentzou, K., Tawell, A., Broekhuisen, M., & Leseman, P. (2014). *CARE curriculum quality analysis and impact review of European early childhood education and care (ECEC)* (Report No. 613318)*.* https://ecec-care.org/fleadmin/careproject/Publications/reports/new_version_CARE_WP4_D4_1_Review_ on_the_efects_of_ECEC.pdf

Melhuish, E., Gardiner, J., & Morris, S. (2017). *Study of Early Education and Development (SEED): Impact study on early education use and child outcomes up to age three.* Department for Education. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034423/SEED-Age_3_RESEARCH_REPORT.pdf

Melhuish, E., & Gardiner, J. (2020). *Study of early education and development (SEED): Impact study on early education use and child outcomes up to age five years.* Department for Education. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/867140/SEED_AGE_5_REPORT_FEB.pdf

Melhuish, E., & Gardiner, J. (2021). *Study of early education and development (SEED): Impact study on early education use and child outcomes up to age seven years.* Department for Education. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1029539/SEED_Age_7_Research_Brief.pdf

Mensah F. K., & Kiernan K. E. (2010). Parents' mental health and children's cognitive and social development: Families in England in the Millennium Cohort Study. *Social Psychiatry and Psychiatric Epidemiology, 45*(11), 1023–1035. https://doi.org/10.1007/s00127-009-0137-y

Momen, N. C., Lasgaard, M., Weye, N., Edwards, J., McGrath, J., & Plana-Ripoll, O. (2022). Representativeness of survey participants in relation to mental disorders: A linkage between national registers and a population-representative survey. *International Jounal of Population Data Science, 7*, 1–11. https://doi.org/10.23889/ijpds.v7i4.1759

Moss, P., & O'brien, M. (2005). Leave policies and research United Kingdom. In F. Deven, & P. Moss (Eds.), *Leave policies and research: Reviews and country notes.* Centrum voor Bevolkings- en Gezinsstudie. https://www.leavenetwork.org/fileadmin/user_upload/k_leavenetwork/annual_reviews/2005_annual_report.pdf

Mutebi, N., & Hobbs, A. (2022). *The impact of remote and hybrid working on workers and organisations.* UK Parliament POST. https://researchbriefings.files.parliament.uk/documents/POST-PB-0049/POST-PB-0049.pdf

Nesta. (2023, 26 January). *Up to 16 million hours of early-years education in England may be missed according to novel research to track attendance.* https://www.nesta.org.uk/press-release/up-to-16-million-hours-of-early-years-education-in-england-may-be-missed-according-to-novel-research-to-track-attendance/

OECD. (2011). *Education at a Glance 2011: OECD Indicators*. OECD Publishing. https://doi.org/10.1787/eag-2011-en

Office for Health Improvement and Disparities. (2021). *Percentage of deliveries to women from ethnic minority groups.* Fingertips, Public Health Data. https://fingertips.phe.org.uk/profile/child-health-profiles/data#page/4/gid/1938133222/pat/159/par/K02000001/ati/15/are/E92000001/iid/92973/age/1/sex/2/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1

Office for Health Improvement and Disparities. (2023, March). *Health inequalities dashboard: Statistical commentary, March 2023.* https://www.gov.uk/government/statistics/health-inequalities-dashboard-march-2023-data-update/health-inequalities-dashboard-statistical-commentary-march-2023

Office for National Statistics. (n.d.-a). *Dataset: Birth* characteristics [2021 edition of this

dataset].

https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/datasets/birthcharacteristicsinenglandandwales

Office for National Statistics. (n.d.-b). *Dataset: Births by parents'* characteristics [2021 edition of this dataset]*.*

https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/datasets/birthsbyparentscharacteristics

Office for National Statistics. (n.d.-c). *Dataset: Families and the labour market, England* [2021 edition of this dataset]*.*

https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/familiesandthelabourmarketenglandlfsandapsdatasets

Office for National Statistics. (n.d.-d). *The national statistics socio-economic classification (NS-SEC)*.

https://www.ons.gov.uk/methodology/classificationsandstandards/otherclassifications/thenationalstatisticssocioeconomicclassificationnssecrebasedonsoc2010

Office for National Statistics. (n.d.-e). *Dataset: Households by type of household and family, regions of England and GB constituent countries* [2021 edition of this dataset]*.*

https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/datasets/householdsbytypeofhouseholdandfamilyregionsofenglandandgbconstituentcountries

Office for National Statistics. (n.d.-f). *How general health (age-standardised) varied across local authorities in England and Wales, 2021.* https://fingertips.phe.org.uk/profile/child-health-profiles/data#page/1/gid/1938133228

Office for National Statistics. (2016, 10 November). *Changes in the value and division of unpaid care work in the UK: 2000 to 2015.* https://www.ons.gov.uk/economy/nationalaccounts/satelliteaccounts/articles/changesinthevalueanddivisionofunpaidcareworkintheuk/2000to2015#changes-in-the-division-of-unpaid-care-between-2000-and-2015-part-1-childcare

Office for National Statistics. (2021, 13 September). *Weekly household spending fell by more than £100 on average during the coronavirus pandemic.* https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/articles/weeklyhouseholdspendingfellbymorethan100onaverageduringthecoronaviruspandemic/2021-09-13

Office for National Statistics. (2023, 10 January). *Education, England and Wales: Census 2021.* https://www.ons.gov.uk/peoplepopulationandcommunity/educationandchildcare/bulletins/educationenglandandwales/census2021#:~:text=Level%201%3A%20one%20to%20four,A%20Levels%20or%20equivalent%20qualifications

Office for National Statistics. (2023, 30 March). *Conceptions in England and Wales*:

2021.
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/conceptionandfertilityrates/bulletins/conceptionstatistics/2021#age-at-conception

Office for National Statistics. (2023, 18 May). *Families and Families and households in the UK: 2022.*
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2022#families

Palisano, R. J., Almarsi, N., Chiarello, L.A., Orlin, M.N., Bagley, A., & Maggs, J. (2009) Family needs of parents of children and youth with cerebral palsy. *Child Care Health Development, 36*(1), 85–92. https://doi.org/10.1111/j.1365-2214.2009.01030.x

Population Health, Clinical Audit and Specialist Care Team. (2022). *Psychological Therapies, Annual report on the use of IAPT services, 2021-22.* NHS Digital.
https://app.powerbi.com/view?r=eyJrIjoiMDk2OWUzMjEtN2YxYS00YzgwLThkMGMtMjNlZWE1MWIyMTk3IiwidCI6IjUwZjYwNzFmLWJiZmUtNDAxYS04ODAzLTY3Mzc0OGU2MjllMiIsImMiOjh9

Savage, L.-É., Tarabulsy, G. M., Pearson, J., Collin-Vézina, D., & Gagné, L.-M. (2019). Maternal history of childhood maltreatment and later parenting behavior: A meta-analysis*. Development and Psychopathology, 31,* 9–21. https://doi.org/10.1017/S0954579418001542

Sherrington, A. (2022, July 25). 2 Years of COVID-19 on GOV.UK. *Government Digital Service.* https://gds.blog.gov.uk/2022/07/25/2-years-of-covid-19-on-gov-uk/

Shuffrey, L. C., Firestein, M. R., Kyle, M. H., Fields, A., Alcántara, C., Amso, D., Austin,J., Bain, J. M., Barbosa, J., Bence, M., Bianco, C., Fernández, C. R., Goldman, S., Gyamfi-Bannerman, C., Hott, V., Hu, Y., Hussain, M., Factor-Litvak, P., Lucchini, M., … Dumitriu, D. (2022). Association of birth during the COVID-19 pandemic with neurodevelopmental status at 6 months in infants with and without in utero exposure to maternal SARS-CoV-2 infection. *JAMA Pediatrics*, *176*(6). https://doi.org/10.1001/jamapediatrics.2021.5563

Speight, S., Maisey, R., Chanfreau, J., Haywood, S., Lord, C., & Hussey, D. (2015). *Study of Early Education and Development. Baseline Survey of Families. Department for Education.*
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/444852/DFERR480_Study_of_early_education_and_development_survey_of_families.pdf

Sutcliffe, A. G., Barnes, J., Belsky, J., Gardiner, J., & Melhuish, E. (2012). The health and development of children born to older mothers in the United Kingdom: Observational study using longitudinal cohort data. *British Medical Journal*, *345*, 5116–5125. https://doi.org/10.1136/bmj.e5116

Sylva, K., Melhuish, E. C. , Sammons, P., Siraj, I., & Taggart, B. (2004). *The Effective Provision of Pre-School Education (EPPE) Project technical paper 12: The final report- Effective Pre-School Education.*
https://discovery.ucl.ac.uk/id/eprint/10005308/1/EPPE12Sylva2004Effective.pdf

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2008). *Final report from the primary phase: Pre-school, school and family influences on children's development during Key Stage 2 (7-11).* Department for Children, Schools and Families.
https://ro.uow.edu.au/cgi/viewcontent.cgi?article=2806&context=sspapers

The Parliamentary Office of Science and Technology. (2021). *Early childhood education and care* (Postnote No. 649). *UK Parliament, The Parliamentary Office of Science and Technology.* https://researchbriefings.files.parliament.uk/documents/POST-PN-0649/POST- PN-0649.pdf

Unicef. (2017). *Early Moments Matter for Every Child: What's the most important thing children have? It's their brains.* UNICEF.
https://www.unicef.org/media/48886/file/UNICEF_Early_Moments_Matter_for_Every_Child-ENG.pdf

Unicef. (2019). *A world ready to learn: Prioritizing quality early childhood education.* UNICEF. https://www.unicef.org/media/57926/file/A-world-ready-to-learn-advocacy-brief-2019.pdf

Villadsen, A., Asaria, M., Skarda, I., Ploubidis, G. B., Williams, M. M., Brunner, E. J., & Cookson, R. (2023). Clustering of adverse health and educational outcomes in adolescence following early childhood disadvantage: population-based retrospective UK cohort study. *Lancet Public Health, 8*(4), e286-e293.
https://doi.org/10.1016/s2468-2667(23)00029-4

Viola, S., & Moncrieff J. (2016). Claims for sickness and disability benefits owing to mental disorders in the UK: Trends from 1995 to 2014. *BJPsych Open*, *2,* 18–24. https://doi.org/10.1192/bjpo.bp.115.002246

Vukojević, M., Zovko, A., Talić, I., Tanović, M., Resić, B., Vrdoljak, I., & Splavski, B., (2017). Parental socioeconomic status as a predictor of physical and mental health outcomes in children: Literature review. *Acta Clinica* Croatia, *56*, 742–748. https://doi.org/10.20471/acc.2017.56.04.23

Wolf, M.-J., Koldewijn, K., Beelen, A., Smit, B., Hedlund, R., & de Groot, I. J. M. (2002). Neurobehavioral and developmental profile of very low birthweight preterm infants in early infancy. Acta Paediatrics*, 91*, 930–938. https://doi.org10.1111/j.1651-2227.2002.tb02858.x

Appendices

Contents

List of tables

List of figures

Appendix 1: Statistical modelling of demographic characteristics on outcome variables

Throughout the report comparisons by demographic variables, such as primary caregiver ethnicity, family income, primary caregiver education, and family type, were conducted to examine socioeconomic differences in the cohort.

Linear/logistic multiple regression was used, with each demographic variable added as an independent variable and adjusted with sample weights. These multivariable analyses aimed to determine the independent and unique contribution of each demographic variable to the outcome of interest while holding other demographics constant. Differences based on these demographics were considered statistically significant at a 5% threshold. No adjustments were made for multiple comparisons so readers should bear this in mind while interpreting the results.

Methodology

All analysis was conducted using R (R Core Team; 2021[25]). All models were specified to account for sample weighting using *svydesign* function from the R *"survey"* package. This function specifies the `design` of the dataset including defining weighting variable which subsequent R code should use. For details of the determination of survey weights, please refer to the Children of the 2020s Technical Report.

Multiple regression models were then specified using *svyglm* from the R *"survey"* package, which incorporates the above specified `design` (which enables the model to account for the sample weighting variable). The *family* parameter of the <u>*svyglm*</u> function was used to specific if models were logistic.

A separate model for each outcome variable of interest was fitted. Family income, primary caregiver education, primary caregiver ethnicity, and family type were treated as predictor variables in each model, Family income and primary caregiver education were treated as continuous variables, family type as binary (with coupled parent/carers as the reference category), and primary caregiver ethnicity was transformed to binary dummy variables (with White ethnicity as the reference category for each of the other ethnicity categories).

R code for an example model specification:

design <- svydesign(ids = ~1, data = DATA, weights = weights)

---

[25] Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

model <- svyglm(outcome_variable ~ income + education + ethnicity + family type, design = design [26])
summary(model)

Models with informal and formal childcare use as outcome variables included the primary caregiver's current occupation as a covariate in the analysis. Occupation was defined as a binary variable as 'currently working, training, volunteering or studying' versus 'not currently working (on parental leave, looking after family, retired, sick or other)'.

All variables (except binary variables) were first standardised using *scale()* function from the R base package before being entered into the model to return standardised coefficients. Odds ratios were calculated from unstandardised coefficients where relevant (where variables were not standardised before being entered into the model).

Results

The statistical analyses assessed whether results were statistically significant using a p-value threshold of 0.05 or below. A statistically significant result means that it is unlikely to have occurred by chance. Only statistically significant results are discussed in the descriptive report. Having established that a result is statistically significant, it may also be helpful to know whether it should be considered a small, medium or large effect. Therefore, along size p-values, standardised coefficients (also referred to as beta coefficients or beta weights) and odds ratios (for logistic regression) are provided to quantify the strength of the relationship (also referred to as the effect sizes) between the predictor and outcome (while holding all other predictors constant) and to allow the interpretation of comparable influence of each predictor variable in the model. As an informal rule of thumb, the effect size of standardised coefficients of 0.1 or less are considered small, of 0.3 are considered medium, and 0.5 are considered large. Odds ratios of 1.5 or less are small, medium between 1.5 and 2.5 and large beyond 2.5. These rules of thumb should be treated with caution, because although they are commonly reported, and are useful reference points, they are not universally agreed upon.

Model results are displayed in Table 1-4.

Table 1. Model results exploring child and primary caregiver health variables by demographic differences

Outcome (shaded in grey) and predictor variable	Standardised Coef. (Odds Ratio)	p-value
Cohort member general health		
Income	0.06	<0.001***
Education	0.02	0.14

[26] Additional parameter of 'family = quasibinomial' was specified for logistic regressions were the outcome variable was binary: '*model <- svyglm(outcome_variable ~ income + education + ethnicity + family type, design = design,* family = quasibinomial*)*'

Family type – Single	-0.12	0.001***
Ethnicity – Asian/Asian British	-0.25	<0.001***
Ethnicity – Black/Black British	0.19	<0.001***
Ethnicity – Mixed/Other British	0.03	0.89
Gestation		
Income	-0.24 (OR = 1.00)	0.004****
Education	-0.008 (OR = 0.99)	0.86
Family type – Single	0.28 (OR = 1.33)	0.07
Ethnicity – Asian/Asian British	-0.13 (OR = 0.88)	0.56
Ethnicity – Black/Black British	-0.37 (OR = 0.69)	0.22
Ethnicity – Mixed/Other British	0.27 (OR = 1.30)	0.31
Birthweight		
Income	0.03	<0.001***
Education	0.02	0.054
Family type – Single	-0.09	<0.001***
Ethnicity – Asian/Asian British	-0.26	<0.001***
Ethnicity – Black/Black British	-0.14	<0.001***
Ethnicity – Mixed/Other British	-0.05	0.14
Primary caregiver general health		
Income	0.15	<0.001***
Education	0.02	0.27
Family type – Single	-0.16	<0.001***
Ethnicity – Asian/Asian British	0.15	0.01*
Ethnicity – Black/Black British	-0.10	0.04*
Ethnicity – Mixed/Other British	0.03	0.6
Depression: PHQ		
Income	-0.48 (OR = 1.00)	<0.001***
Education	-0.12 (OR = 0.89)	0.001**
Family type – Single	0.29 (OR = 1.34)	0.01*
Ethnicity – Asian/Asian British	0.02 (OR = 1.02)	0.77
Ethnicity – Black/Black British	-0.06 (OR = 0.94)	0.93
Ethnicity – Mixed/Other British	-0.13 (OR = 0.88)	0.58
Anxiety: GAD		
Income	-0.42 (OR = 1.00)	<0.001***
Education	0.04 (OR = 1.03)	0.38
Family type – Single	0.18 (OR = 1.19)	0.08
Ethnicity – Asian/Asian British	-0.82 (OR = 0.44)	<0.001***
Ethnicity – Black/Black British	-0.66 (OR = 0.52)	0.002**
Ethnicity – Mixed/Other British	-0.35 (OR = 0.70)	0.07
Parenting Stress		
Income	0.05	<0.001***
Education	0.06	<0.001***
Family type – Single	0.16	0.29
Ethnicity – Asian/Asian British	-0.04	<0.001***
Ethnicity – Black/Black British	-0.08	0.19
Ethnicity – Mixed/Other British	0.06	0.35
Loneliness		
Income	-0.08	<0.001***
Education	0.10	<0.001***
Family type – Single	0.25	<0.001***
Ethnicity – Asian/Asian British	-0.39	<0.001***
Ethnicity – Black/Black British	-0.24	<0.001***
Ethnicity – Mixed/Other British	-0.26	<0.001***
Cohort child COVID-19 Infection		
Income	0.12 (OR = 1.00)	<0.001***
Education	0.24 (OR = 1.12)	<0.001***
Family type – Single	-0.10 (OR = 0.90)	0.21
Ethnicity – Asian/Asian British	-0.10 (OR = 0.29)	<0.001***
Ethnicity – Black/Black British	-0.22 (OR = 0.22)	<0.001***
Ethnicity – Mixed/Other British	-0.42 (OR =)	0.002***

Note. OR = unstandardised odds ratio provided for logistic regression.

Model results from chapter 4 are displayed in Table 2.

Table 2. Model results exploring home learning environment variables by demographic differences

Outcome (shaded in grey) and predictor variable	Standardised Coef. (Odds Ratio)	p-value
Outdoor, green and natural spaces		
Income	0.10	<0.001***
Education	-0.02	0.56
Family type – Single	-0.16	0.11
Ethnicity – Asian/Asian British	-0.14	0.24
Ethnicity – Black/Black British	-0.67	0.04*
Ethnicity – Mixed/Other British	-0.46	0.01*
Home learning combined score		
Income	*0.09*	*<0.001****
Education	0.06	0.001**
Family type – Single	0.07	0.10
Ethnicity – Asian/Asian British	-0.33	<0.001***
Ethnicity – Black/Black British	-0.34	<0.001***
Ethnicity – Mixed/Other British	-0.16	0.07
Screen use		
Income	*-0.03*	*0.01**
Education	-0.08	<0.001***
Family type – Single	0.19	<0.001***
Ethnicity – Asian/Asian British	0.06	0.16
Ethnicity – Black/Black British	0.40	<0.001***
Ethnicity – Mixed/Other British	-0.09	0.08

Model results from chapter 4 are displayed in Table 3[27][28].

Table 3. Model results exploring ECEC use by demographic differences.

Outcome (shaded in grey) and predictor variable	Standardised Coef. (Odds Ratio)	p-value
Formal childcare use		
Income	0.50 (OR = 1.00)	<0.001***
Education	0.39 (OR = 1.32)	<0.001***
Family type – Single	0.49 (OR = 1.63)	<0.001***
Ethnicity – Asian/Asian British	-1.34 (OR = 0.26)	<0.001***
Ethnicity – Black/Black British	-0.31 (OR = 0.73)	0.16

---

[27] Models with informal and formal childcare use as outcome variables included primary caregivers current occupation as a covariate in the analysis. Occupation was defined as a binary variable as 'currently working, training, volunteering or studying' versus 'not currently working (on parental leave, looking after family, retired, sick or other)'.

[28] Models with informal and formal childcare use as outcome variables were conducted with outcome variables as binary variables so that the first model assessed likelihood of using formal ECEC versus not using formal ECEC (which could include informal ECEC users and/or no ECEC users), and the other model assessed likelihood of using informal ECEC versus not using informal ECEC (which could include formal ECEC users and/or no ECEC users).

Ethnicity – Mixed/Other British	-0.90 (OR = 0.41)	<0.001***
Occupation – Not currently working	-2.77 (0.07)	<0.001***
Informal childcare use		
Income	0.10 (OR = 1.00)	0.001***
Education	0.06 (OR = 1.04)	0.08
Family type – Single	0.47 (OR = 1.60)	<0.001***
Ethnicity – Asian/Asian British	-0.38 (OR = 0.69)	<0.001***
Ethnicity – Black/Black British	-0.43 (OR = 0.65)	0.002**
Ethnicity – Mixed/Other British	-0.37 (OR = 0.70)	0.008*
Occupation – Not currently working	-1.19 (OR = 0.31)	<0.001**

Model results from chapter 5 are displayed in Table 4.

Table 4. Model results exploring service use by demographic differences.

Outcome (shaded in grey) and predictor variable	Standardised Coef. (Odds Ratio)	p-value
Access difficulty to health visitor		
Income	0.04 (OR = 1.00)	0.29
Education	0.15 (OR = 1.11)	<0.001***
Family type – Single	0.26 (OR = 1.30)	0.002**
Ethnicity – Asian/Asian British	-0.26 (OR = 0.77)	0.02*
Ethnicity – Black/Black British	-0.33 (OR = 0.72)	0.04*
Ethnicity – Mixed/Other British	0.03 (OR = 1.03)	0.82
Access difficulty to GP		
Income	-0.08 (OR = 1.00)	0.017*
Education	0.01 (OR = 1.00)	0.72
Family type – Single	0.11 (OR = 1.11)	0.19
Ethnicity – Asian/Asian British	0.10 (OR = 1.11)	0.30
Ethnicity – Black/Black British	-0.25 (OR = 0.78)	0.08
Ethnicity – Mixed/Other British	0.07 (OR = 1.08)	0.59
Accessed a family hub		
Income	0.08 (OR = 1.00)	0.02*
Education	0.13 (OR = 1.09)	<0.001***
Family type – Single	-0.14 (OR = 0.87)	0.11
Ethnicity – Asian/Asian British	-0.45 (OR = 0.64)	<0.001***
Ethnicity – Black/Black British	-0.06 (OR = 0.95)	0.70
Ethnicity – Mixed/Other British	0.006 (OR = 1.01)	0.96

Appendix 2: Analysis of the association between early home learning environment and child language development

To determine whether the home learning environment was associated with children's language comprehension development at 9 and a half months, three separate sample probability weight adjusted linear regression models were conducted with number of words understood at 9 and a half months as an outcome variable and the predictor variables of combined home learning activities score, frequency of visit to outdoor green and natural spaces in the last month and number of minutes spent watching digital content on a screen.

Methodology

All analysis was conducted using R (R Core Team; 2021 [29]). All models were specified to account for sample weighting using *svydesign* function from the R *"survey"* package. This function specifies the `design` of the dataset including defining weighting variable which subsequent R code should use.

Multiple linear regression models were then specified using *svyglm* from the R *"survey"* package, which incorporates the above specified `design` (which enables the model to account for the sample weighting variable). A separate model for each predictor variable of interest was fitted and each included the covariate of cohort members age in months at interview to adjust for differences in language developed accounted for by the child's age. Associations were considered significant at 5% threshold (p-values 0.05).

R code for an example model specification:

design <- svydesign(ids = ~1, data = DATA, weights = weights)
model <- svyglm(Number_of_words_understood ~ Home_learning_combined_score + Age, design = design)
summary(model)

All variables were first standardised using *scale()* function from the R base package before entered being entered into the model to return standardised coefficients. Standardised coefficients (also referred to as beta coefficients or beta weights) are provided to quantify the strength of the relationship (also referred to as the effect sizes) between the predictor and outcome (while holding the age covariate constant) and to allow the interpretation of the comparable influence of each predictor variable. As an informal rule of thumb, the effect size of standardised coefficients of 0.1 or less are considered small, of 0.3 are considered medium, and 0.5 are considered large.

---

[29] Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

Results

The number of words the child could understand at 9 and a half months was positively associated with the home learning activities combined score, but did not significantly associate with frequency of visit to outdoor green and natural spaces nor with the typical number of minutes a day spent watching a digital screen. Table 6 displays regression coefficients and p-values.

Table 5. Language development and home learning environment regression analysis findings

Predictor variable	Standardised Coef.	p-value
Combined home learning activities score	0.07	<0.001***
Outdoor green and natural space frequency of visit	0.005	0.11
Minutes spent watching a digital screen	0.02	0.31

Appendix 3: Primary caregivers' relationship to the cohort child

Table 6. Percentage of relationship types of primary caregiver to cohort child

Relationship between primary caregiver and cohort child	Percentage (%)
Biological mother	92
Biological father	7
Adoptive parent	<1
Foster parent/special guardian	<1
Step-parent	<1
Grandparent	<1
Full brother/sister	<1
Half-brother/sister	<1
Step-brother/sister	<1
Other relative	<1
Unweighted Base	*8612*
Weighted Base	*8599*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

Appendix 4: Percentage of primary caregivers with each of the academic and vocational qualifications and equivalised educational qualification level

In COT20s W1 respondents were asked what educational qualification they had from a list of options (see Table 8 & 9). This was asked across two questions, one list focusing on academic qualifications and the other on vocational qualifications.

Table 7. Percentages of primary caregivers with each academic qualification

Highest level of education	Percentage (%)
University Higher Degree - Doctorate (PhD)	1
University Higher Degree - Masters Degree (MA, MSc, MPhil)	9
Degree (e.g. BA, BSc)	35
Foundation degree	4
Other degree level qualifications such as graduate membership of professional institutes	3
PGCE (Post-Graduate Certificate of Education) or equivalent	5
Other teaching qualification	1
Access to Higher Education (HE) Diploma / Scottish Wider Access Programme (SWAP), Accreditation of Prior Learning (APL) / Accreditation of Prior Experiential Learning (APEL)	5
A Leve l / A2 Level (GCE Advanced Level)	28
AS Level (not complete A Level)	11
Certificate of Sixth Year Studies	0
Advanced Highers	1
Highers	1
GCSE / iGCSE	56
Credit Standard Grade / National 5 / Intermediate 2	0
General Standard Grade / National 4 / Intermediate 1	0
Foundation Standard Grade / National 3 / Access 3	1
Other academic qualification	6
None of the qualifications listed	9
Unweighted Base	*8514*
Weighted Base	*8509*

Base: All primary caregiver   Source: COT20s wave 1
Table shows column %

Table 8. Percentages of primary caregivers with each vocational qualification

Highest level of education	Percentage (%)
Professional qualifications at degree level e.g. graduate member of professional institute, chartered accountant or surveyor	4
Nursing or other medical qualifications (below degree level)	2
NVQ or SVQ - Level 4 or 5	3
NVQ or SVQ - Level 3	15
NVQ or SVQ - Level 2	12
NVQ or SVQ - Level 1	4
GNVQ – Advanced	1
GNVQ – Intermediate	1
GNVQ - Level 3	1
GNVQ - Level 2	1
GNVQ - Foundation	0
City & Guilds - Advanced craft, Part III	0
City & Guilds - Craft, Part II	0
City & Guilds - Craft, Part I / d.	0
City & Guilds - Level 3	2
City & Guilds - Level 2	2
City & Guilds - Level 1	1
RSA - Advanced Diploma	1
RSA - Higher Diploma	1
RSA - RSA Diploma	0
RSA - RSA Stage I, II,III	0
BTEC - Higher Level	3
BTEC - National	6
BTEC - First	2
SCOTVEC - National Certificate	0
SCOTVEC - First or general diploma	0
SCOTVEC - General diploma / d.	0
SCOTVEC - Modules	0
HND or HNC	1
OND or ONCM	0
Junior certificate	0
Other vocational qualifications (including some overseas)	5
None of the qualifications listed	49

Unweighted Base	8454
Weighted Base	8451

Base: All primary caregiver   Source: COT20s wave 1
Table shows column %

Equivalised educational qualification level

For analysis purposes, an equivalised educational qualification metric for highest level of education was derived. The method used to derive this variable is as described by the MCS sweep 7 protocol (Agalioti-Sgompou et al., 2017) and involved matching the two types of qualifications (academic and vocational) in terms of qualification level and collapsing the data into a 6-point scale (no qualification to level 5 qualification). Table 10 summarises the qualification and equivalised qualification level.

Table 9. Qualification and the equivalised qualification level

Qualification	Level
Academic	
University Higher Degree - Doctorate (PhD)	5
University Higher Degree - Masters Degree (MA, MSc, MPhil)	5
Degree (e.g. BA, BSc)	4
Foundation degree	4
Other degree level qualifications such as graduate membership of professional institutes	5
PGCE (Post-Graduate Certificate of Education) or equivalent	5
Other teaching qualification	4
Access to Higher Education (HE) Diploma / Scottish Wider Access Programme (SWAP), Accreditation of Prior Learning (APL) / Accreditation of Prior Experiential Learning (APEL)	3
A Level / A2 Level (GCE Advanced Level)	3
AS Level (not complete A Level)	3
Certificate of Sixth Year Studies	3
Advanced Highers	3
Highers	3
GCSE / iGCSE	2
Credit Standard Grade / National 5 / Intermediate 2	2
General Standard Grade / National 4 / Intermediate 1	1
Foundation Standard Grade / National 3 / Access 3	0 or No qualification
Vocational	
Professional qualifications at degree level eg. graduate member of professional institute, chartered accountant or surveyor	5

Nursing or other medical qualifications (below degree level)	4
NVQ or SVQ - Level 4 or 5	4
NVQ or SVQ - Level 3	3
NVQ or SVQ - Level 2	2
NVQ or SVQ - Level 1	1
GNVQ – Advanced	3
GNVQ – Intermediate	2
GNVQ - Level 3	3
GNVQ - Level 2	2
GNVQ - Foundation	1
City & Guilds - Advanced craft, Part III	3
City & Guilds - Craft, Part II	2
City & Guilds - Craft, Part I / d	1
City & Guilds - Level 3	3
City & Guilds - Level 2	2
City & Guilds - Level 1	1
RSA - Advanced Diploma	3
RSA - Higher Diploma	4
RSA - RSA Diploma	2
RSA - RSA Stage I, II,III	1
BTEC - Higher Level	4
BTEC - National	3
BTEC - First	2
SCOTVEC - National Certificate	3
SCOTVEC - First or general diploma	2
SCOTVEC - General diploma / d	1
SCOTVEC - Modules	1
HND or HNC	4
OND or ONCM	3
Junior certificate	1
Both	
Other academic/vocational qualifications (including some overseas)	0 or No qualification
None of these qualifications [EXCLUSIVE]	0 or No qualification

Appendix 5: Cohort children's and primary caregivers' ethnicities

Table 10. Percentages of primary caregiver's and cohort child's ethnicities

Ethnicity group	Percentage (%) Primary Caregiver	Percentage (%) Cohort child
White - English/Welsh/Scottish/Northern Irish/British	70	70
White - Irish	1	<1
White - Gypsy or Irish Traveller	<1	<1
White - Roma	<1	<1
Any other White background	8	6
Mixed/multiple ethnic groups - White and Black Caribbean	1	2
Mixed/multiple ethnic groups - White and Black African	<1	1
Mixed/multiple ethnic groups - White and Asian	1	2
Any other mixed/multiple ethnic background	<1	2
Asian/Asian British - Indian	3	2
Asian/Asian British - Pakistani	4	4
Asian/Asian British - Bangladeshi	2	2
Asian/Asian British - Chinese	1	<1
Any other Asian background	2	1
Black/African/Caribbean/Black British - African	4	4
Black/African/Caribbean/Black British - Caribbean	1	1
Any other Black/African/Caribbean background	<1	<1
Other ethnic group - Arab	1	1
Any other ethnic group	1	1
Unweighted Base	*8572*	*8572*
Weighted Base	*8559*	*8560*

Base: All primary caregivers and all cohort children. Table shows column %   Source: COT20s wave 1

Appendix 6: Primary caregivers' religious identities.

Table 11. Percentages of primary caregivers' religious identities

Religion	Percentage (%)
No religion	54
Christian (including Church of England, Catholic, Protestant and all other Christian denominations)	33
Muslim	11
Hindu	1
Sikh	<1
Jewish	<1
Buddhist	<1
Any other religion	<1
Unweighted Base	*8544*
Weighted Base	*8530*

Base: All primary caregivers. Table shows column %   Source: COT20s wave 1

Appendix 7: Missing data approach

Missing data is a common problem in survey research and may be caused by a variety of factors, including participant non-response, attrition/loss to follow-up and technological or respondent errors. In addition to reducing statistical power, missing data—when such data are missing systematically—can introduce bias in statistical estimates, the extent of which will depend on the pattern (or underlying causes) of missingness. A range of methods are available to data analysts to account for, and limit biases associated with, missing data, including Multiple Imputation, Inverse Probability Weighting and Full Information Maximum Likelihood estimation. In general, these techniques assume that the missing data are Missing at Random (MAR), which implies that systematic differences between the missing values and the observed values can be explained by observed data, or that, given the observed data, the reasons for missingness do not depend on unobserved variables. A broad range of 'auxiliary variables' may be used to impute the missing data and improve the plausibility of MAR and therefore correct for bias. It is generally not possible to test the MAR assumption, so appropriate adjustment requires judgement on the part of the data analyst to choose appropriate techniques and informative auxiliary variables to bolster the plausibility of the imputation. Empirical work and simulations suggest that missing data techniques can effectively reduce bias.

Because in general there was comparatively little missing data, and for ease of interpretation, in the main report we present complete case analysis. However, we also conducted Multiple Imputation (MI) analyses for all the primary questions addressed by the report, in order to evaluate the extent to which the substantive conclusions and estimates presented might be influenced by missing data. These analyses are summarised here, and for each instance where we identified a non-trivial change in a statistical estimate these were noted as a footnote in the relevant section of the main report. Overall, non-trivial differences between multiple imputation (MI) results and non-MI were rare, and small in size.

Multiple Imputation

Multiple imputation is a statistical technique that leverages the predictability of missing observations from observed data to impute missing values. It accounts for the intrinsic uncertainty in such imputations by generating multiple imputed datasets drawn from a statistical model with error, which are then combined to produce an average estimate and adjusted standard errors and significance tests or confidence intervals. In our analyses, we used Multiple Imputation with Chained Equations, which is a flexible technique for modelling missing data of varying distributions or data types (continuous, binary, ordinal, multinomial). We chose all variables presented in the report as covariates for the imputation models and, where they also contained missing data, they were also treated as targets for imputation in iterative fashion. We used STATA's *mi impute chained* package, and generally followed the Centre for Longitudinal Studies' missing data

strategy approach[30]. Twenty multiple imputation datasets were generated. Where relevant, derived variables (variables computed from multiply imputed data) were created using STATA's *passive* command. Rather than present an exhaustive account of these analyses, we describe below two examples where the estimates were highly similar between the non-imputed and imputed datasets, and *all* the examples where there were some non-trivial differences.

Example 1: Pre-term birth and socio-demographic disparities

In chapter 3 we looked at rates of pre-term birth as reported by primary caregivers and examined socio-demographic differences in rates of pre-term birth. In the non-imputed dataset, 194 cases had missing values for the cohort child's gestation. In this dataset, 95.7% of cohort babies were estimated to be born full-term, 3.45% pre-term, 0.75% very pre-term and 0.12% extremely pre-term. The following STATA code was run to estimate the rate of pre-term birth from the multiply imputed dataset, taking account of sample weights using STATA's *svy* command:

mi estimate: svy: proportion gestation_term

The MI estimates of the above proportions were 95.6% (95% CI: 95.1%, 96.1%) full term, 3.5% (95% CI:3.1%, 3.9%) preterm, 0.76% (95% CI: 0.57%, 0.94%) very preterm and 0.14% (95% CI: 0.05%, 0.22%) extremely preterm.

When examining disparities in pre-term birth we first had to estimate income quintile thresholds based on sample weighted and imputed data. As noted in the report, income was one of the study variables that contained the most missing data (N= 1305). To do this, we used the following code:

mi estimate: qreg equivalised_income [pweight=wt_final], quantile(20)

mi estimate: qreg equivalised _income [pweight=wt_final], quantile(40)

mi estimate: qreg equivalised _income [pweight=wt_final], quantile(60)

mi estimate: qreg equivalised _income [pweight=wt_final], quantile(80)

A logistic regression model was then estimated based on a binary dependent variable (preterm versus not) using the following code:

mi estimate: svy:logit term equivalised_income DV_caregiver_highest_Education white_non_white_ethnicity single_parent

---

[30] Mostafa, T., Narayanan, M., Pongiglione, B., Dodgeon, B., Goodman, A., Silverwood, R.J., & G.B. Ploubidis, G.B. (2021) *Missing at random assumption made more plausible: evidence from the 1958 British birth cohort*, Journal of Clinical Epidemiology

The regression estimates from the MI analysis corresponded well to those from the non-imputed analyses for the significant associations (and the non-significant ones varied numerically around zero and remained entirely non-significant), as demonstrated in table 12.

Table 12. MI and non-MI regression estimates from analysis on the association between gestation term (preterm/not preterm) and demographic difference.

	Coefficient	Std. err.	t	p-value	Lower 95% CI	Upper 95% CI
Imputed						
Income	1.24E-05	4.70E-06	2.63	0.009	3.14E-06	2.16E-05
Education	0.046	0.043	1.08	0.279	-0.038	0.130
Ethnicity – White	0.025	0.132	0.19	0.850	-0.234	0.284
Family type - Single parent/carer	-0.229	0.145	-1.58	0.114	-0.513	0.055
Non-imputed						
Income	1.32E-05	5.18E-06	2.55	0.011	3.04E-06	2.34E-05
Education	0.023	0.050	0.46	0.644	-0.074	0.120
Ethnicity – White	-0.066	0.157	-0.42	0.671	-0.374	0.241
Family type - Single parent/carer	-0.307	0.161	-1.91	0.057	-0.624	0.009

Note. CI = confidence interval. Std.err. = standard error. Ethnicity was treated as a binary variable with non-white as the reference group. Family type was treated as binary with single parent/carer as the reference group.

Example 2: primary caregiver depression symptoms

The data on primary caregiver depression had considerably more missingness than the gestation data described above, with 1025 cases missing data on this variable out of a total of 8628 primary caregivers in the sample. To investigate the impact of missing data on the analyses of parental depression, we used the passive command to derive the clinical cut-points, based on the imputed raw scores for the PHQ-2 (of 3 or higher), as follows:

mi passive: gen phq_thres = PHQ_score>2 if !mi(PHQ_score)

The proportion of primary caregivers over the threshold for risk of depression was estimated using the mi estimate command:

mi estimate: svy: proportion phq_thres

The MI model estimated that 9.3% of the sample were above threshold on the PHQ, in comparison with the non-imputed estimate of 8.6% (based on 7603 cases), a difference of less than 1%. When we examined socio-demographic disparities in rates of

depression, the results from the MI analyses were highly similar to the non-imputed analyses, as demonstrated in table 13.

Table 13. MI and non-MI regression estimates from analysis on the association between scoring above threshold for risk of depression term and demographic difference

	Coefficient	Std. err.	t	p-value	Lower 95% CI	Upper 95% CI
Imputed						
Income	-2.65E-05	3.65E-06	-7.26	<.0001	-3.37E-05	-1.93E-05
Education	-0.095	0.036	-2.65	0.009	-0.165	-0.024
Ethnicity – White	0.048	0.102	0.47	0.639	-0.152	0.248
Family type - Single parent/carer	0.320	0.106	3.02	0.003	0.112	0.529
Non-imputed						
Income	-2.95E-05	3.89E-06	-7.58	<.0001	-3.71E-05	-2.18E-05
Education	-0.110	0.039	-2.84	0.005	-0.187	-0.034
Ethnicity – White	0.037	0.117	0.32	0.75	-0.192	0.267
Family type - Single parent/carer	0.302	0.119	2.53	0.012	0.068	0.536

Note. CI = confidence interval. Std.err. = standard error. Ethnicity was treated as a binary variable with non-white as the reference group. Family type was treated as binary with single parent/carer as the reference group.

Non-trivial differences between MI and non-MI analyses

Out of all the analyses contained in the report, there were two instances that we judged as showing non-trivial differences between the MI and non-MI analyses. In both cases, the discrepancies were apparent in the multivariable regression analyses and not in the estimated proportions. The first concerned socio-demographic disparities in home learning activities, where some differences were seen in the regression estimates, as displayed in table 14.

Table 14. MI and non-MI regression estimates from analysis on the association between combined home learning score and demographic difference

	Coefficient	Std. err.	t	p-value	Lower 95% CI	Upper 95% CI
Imputed						
Income	4.1E-05	5.42E-06	7.56	<.0001	3.03E-05	5.17E-05
Education	0.256	0.062	4.14	<.0001	0.134	0.377
Ethnicity – White	1.875	0.207	9.05	<.0001	1.468	2.282
Family type - Single parent/carer	0.254	0.203	1.25	0.21	-0.145	0.653
Non-imputed						
Income	3.83E-05	5.37E-06	7.13	<.0001	2.78E-05	4.88E-05
Education	0.193	0.071	2.73	0.006	0.054	0.331
Ethnicity – White	1.814	0.238	7.62	<.0001	1.347	2.282
Family type - Single parent/carer	0.195	0.219	0.89	0.375	-0.236	0.625

Note. CI = confidence interval. Std.err. = standard error. Ethnicity was treated as a binary variable with non-white as the reference group. Family type was treated as binary with single parent/carer as the reference group.

It can be seen from the above table that the association between education and the home learning environment (conditional on the other covariates) was somewhat larger in the MI analyses than the non-MI analyses, even though the significance of the estimate was unaffected in any substantive sense. Furthermore, the numerical difference in the estimate was comparatively small. Such differences could conceivably be of scientific or technical importance even though for most purposes the substantive interpretation would not be different. It is also worth emphasising that the univariate association between education and the home learning environment (i.e., not conditioning on the other covariates) produced very similar estimates between the MI and non-MI analyses. For example, in the MI analysis, an estimated 44.1% of primary caregivers in the lowest education group were also in the lower third of the home learning environment scores, compared to an estimate of 42.7% in the non-MI analysis.

Somewhat similarly, in the screen use analyses, we found a potentially non-trivial (although not large) difference in the regression analyses of socio-demographic disparities between the MI and non-MI analyses, as displayed in table 15.

Table 15. MI and non-MI regression estimates from analysis on the association between screen use and demographic differences

	Coefficient	Std. err.	t	p-value	Lower 95% CI	Upper 95% CI
Imputed						
Income	-1.119E-04	3.480E-05	-3.21	0.001	-1.803E-04	-4.350E-05
Education	-1.791	0.416	-4.31	<.0001	-2.607	-0.975
Ethnicity – White	-4.614	1.471	-3.14	0.002	-7.503	-1.725
Family type - Single parent/carer	8.126	1.580	5.14	<.0001	5.023	11.228
Non-imputed						
Income	-1.066E-04	3.490E-05	-3.06	0.002	-1.751E-04	-3.810E-05
Education	-2.506	0.475	-5.27	<.0001	-3.439	-1.573
Ethnicity – White	-4.399	1.660	-2.65	0.008	-7.657	-1.141
Family type - Single parent/carer	8.773	1.836	4.78	<.0001	5.168	12.378

As in the other example, the main difference between the MI and non-MI analyses concerned the association with education, with a larger estimate obtained in the MI analyses. Again, the difference between the two estimates was small (just in the second significant figure), and the substantive interpretation would not likely be different for most research or policy purposes. Furthermore, the univariate mean estimates (i.e., not conditioned on other covariates) were very similar between the MI and non-MI analyses: in the MI analyses, we estimated a mean of 31.4 minutes of screen use per day in the lowest education group and 19.6 in the highest income group. In the non-MI analyses, the comparable estimates were 31.6 and 19.6 minutes respectively.

Appendix 8: Equivalised income

In the first survey of Children of the 2020s, all primary caregivers were asked to report their net household (theirs and their partners combined) income after any education, such as income tax or national insurance. Respondents were given the option to report their income annually, monthly or weekly over 20 banded response options (see Table 13)

Table 16. Twenty income bands and annually, monthly and weekly amount

Band	Annually	Monthly	Weekly
1	Less than £6,500	Less than £550	Less than £120
2	£6,500 to less than- £10,500	£550 to less than £870	£120 to less than £200
3	£10,500 to less than £13,000	£870 to less than £1,100	£200 to less than £250
4	£13,000 to less than £15,000	£1,100 to less than £1,270	£250 to less than £300
5	£15,000 to less than £17,000	£1,270 to less than £1,430	£300 to less than £330
6	£17,000 to less than £19,000	£1,430 to less than £1,600	£330 to less than £370
7	£19,000 to less than £21,000	£1,600 to less than £1,760	£370 to less than £410
8	£21,000 to less than £23,000	£1,760 to less than £1,930	£410 to less than £450
9	£23,000 to less than £25,500	£1,930 to less than £2,100	£450 to less than £490
10	£25,500 to less than £27,500	£2,100 to less than £2,290	£490 to less than £530
11	£27,500 to less than £30,000	£2,290 to less than £2,500	£530 to less than £580
12	£30,000 to less than £32,500	£2,500 to less than £2,700	£580 to less than £630
13	£32,500 to less than £35,000	£2,700 to less than £2,930	£630 to less than £680
14	£35,000 to less than £38,000	£2,930 to less than £3,170	£680 to less than £730
15	£38,000 to less than £41,500	£3,170 to less than £3,460	£730 to less than £800
16	£41,500 to less than £46,000	£3,460 to less than £3,810	£800 to less than £880
17	£46,000 to less than £51,500	£3,810 to less than £4,270	£880 to less than £990
18	£51,500 to less than £59,500	£4,270 to less than £4,940	£990 to less than £1,140
19	£59,500 to less than £75,000	£4,940 to less than £6,270	£1,140 to less than £1,450
20	£75,000 or more	£6,270 or more	£1,450 or more

In order to allow comparisons of the living standards of different family types, income was equivalised using the HBAI Modified OECD scale[31] to take into account variations in the size and composition of the family, including the primary caregiver, their cohabiting partner and their dependent children. Families with many members will need a higher income to achieve the same standard of living as households with fewer members, and living costs for adults are normally higher than for children. After equivalisation has been applied, households with a different composition but the same equivalised income can be considered to have a comparable standard of living.

---

[31] https://www.gov.uk/government/statistics/households-below-average-income-for-financial-years-ending-1995-to-2020/household-below-average-income-series-quality-and-methodology-information-report-fye-2020#equivalisation-1

Methodology

Step 1: Merge the annual, monthly, and weekly income response bands.

Merging bands involved creating one variable denoting family income. Bands and annual, month, and weekly income are presented in Table 13. For example, households earning Less than £6,500 annually, Less than £550 monthly or Less than £120 weekly would be in income band 1.

Step 2: Prepare the household equivalence scale.

As the question in the CAPI asked about the primary caregivers' and their partners' combined net income, the household equivalence scale should only include the primary caregiver and their partner plus any dependents (defined as under 18 year olds who are the biological/foster/adoptive child of the primary caregiver or their partner).

Each member of the household is assigned an equivalence value. The first adult (18 years or older or the parent of the cohort member) in each household is given a value of 0.67, partners, dependent children aged 14 to 17 year 0.33, and dependent children under 14 years 0.2. These values are then summed to produce a household equivalence scale value.

There were some families who reported no adults in the household. These families were kept in the calculation as plausible cases and the primary respondent was asigned a value of 0.67.

Additionally, there were 130 primary caregivers who had reported "prefer not to say" (PNS) regarding their own age. Those with PNS recorded as the respondent's age have been assigned a household equivalence score of 0.67, under the assumption that they are the parent/caregiver of the cohort child.

Step 3: Divide the midpoint of annual income bands by household composition weight

For the lower income band (Less than £6,500) the midpoint was calculated between 0 and 6500. For the upper income band (75,000 or more), the midpoint was calculated between 75,000 and 90,000 which was set based on a sensitivity analysis of optimal upper cut off.

Step 4: Create sample probability weighted deciles and quintiles of the equivalised income.

R function xtile (package = "statar"[32]) was used to create equally weighted deciles of the equivalised income. The function divides the input (in this case the equivalised income)

---

[32]https://www.rdocumentation.org/packages/radiant.data/versions/1.0.0/topics/xtile

into n (in the case of deciles n = 10 or for quintile n = 5) equally-sized intervals and assigns a numeric value to each observation that indicates the interval it belongs to.

Results

In total there were 1305 respondents with missing family equivalised income data, having declined to answer the survey question related to family income.

The weighted distribution of equivalised income are displayed in Figure 1. The distribution demonstrates a normal though slightly left skewed distribution indicating a slightly higher proportion of households at the lower end of the equivalised income measure. The weighted normalised equivalised income deciles are displayed in Figure 2, and demonstrates an evenly proportioned distribution of approximately 10% the sample in each decile.

Figure 1. Distribution of equivalised income
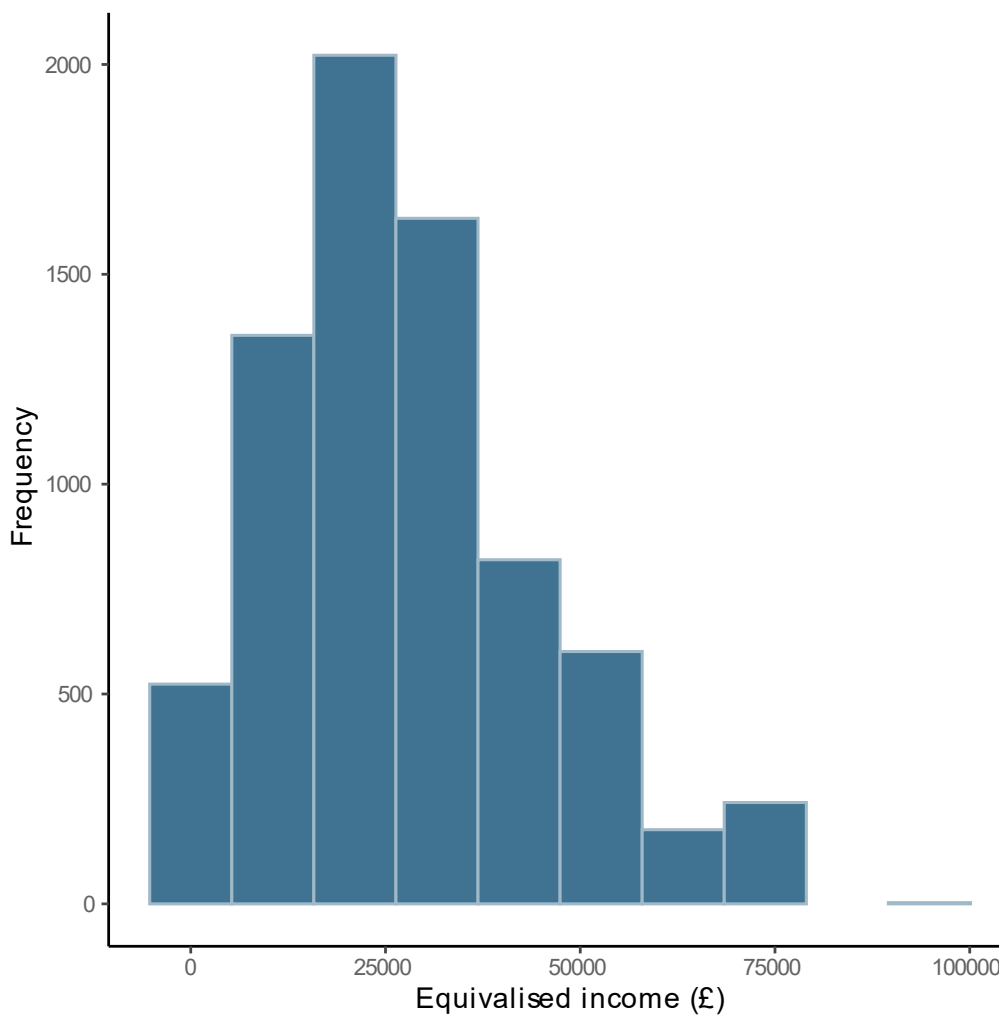
Figure 2. Normalised deciles of equivalised income
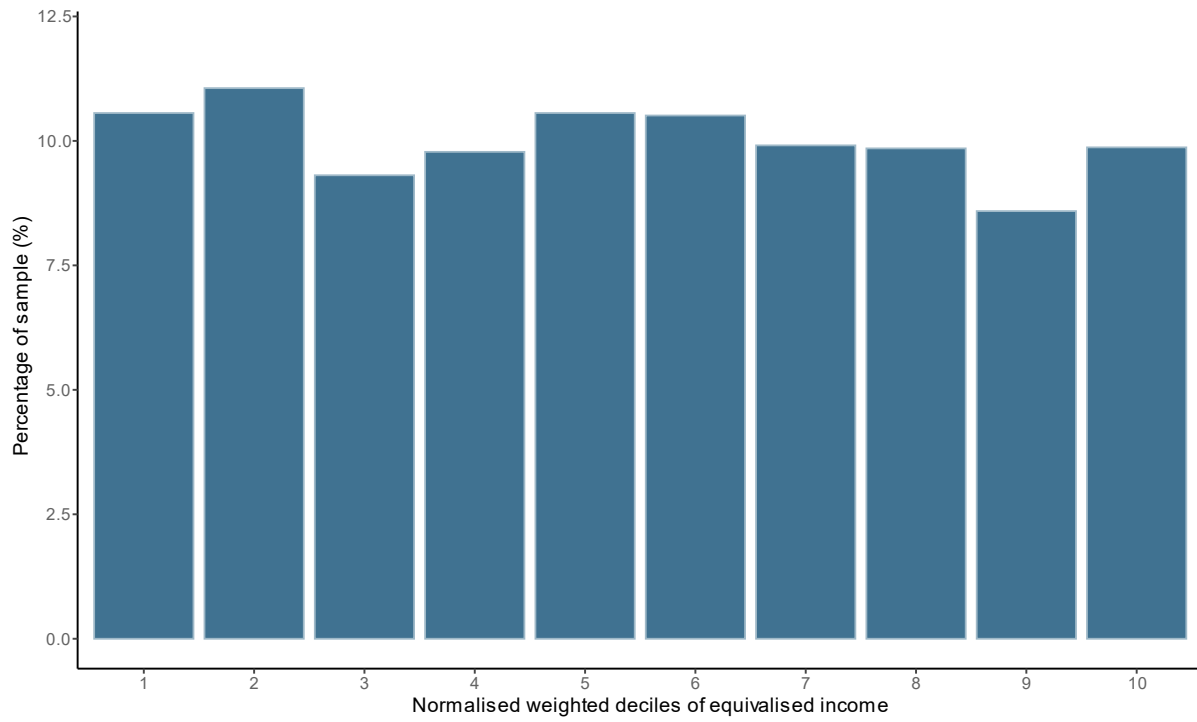
Appendix 9: Representativeness of the subgroup of respondents who completed the first BabySteps research activity

Primary caregivers were invited to download and take part in the BabySteps app. This is a free smartphone app that was designed for the COT20s study and allows additional data collection via a set of short research activities (mini-surveys) that are offered to participants approximately once a month.

This report contains data from the first research activity: 'How do you use greenspaces?'. As the first BabySteps mini-survey, this activity was intentionally restricted to a sub-sample of participants to enable data collection on this topic from a large enough subgroup for analysis, without affecting the schedule for issuing BabySteps surveys at other developmental milestones from age 9 months onwards. Caregivers who took part in the mainstage interview when their child happened to be aged under 9 months were selected to receive the greenspaces research activity, which was then made available for them to complete from age 8 months until the child was 9 months and 21 days. The main survey fieldwork period (thus the time when participants would have begin using the app) could have occurred when the child was older than 9 months and 21 days, meaning those participants would not have been invited to take part in the greenspaces survey. Over half of BabySteps users registered on the app after the availability of this is activity, therefore the first research activity was available to a subset of 2787 primary caregivers. We did not expect any systematic/selection bias from this selection method because whether the cohort member was under 9 months and 21 days at the time of the interview was random. The extent to which the subset differed from the main sample is examined below.

Methodology

In total 1489 respondents completed the 'How do you use greenspaces?'. To determine the representative of the subgroup of primary caregivers who completed the BabySteps task to the rest of the cohort sample, a series of analysis of key demographics was conducted.

All analysis was conducted using R (R Core Team; 2021). Analysis was conducted using t-tests to determine differences in primary caregivers mean age (years), mean annual family equivalised income, and median equivalised education qualification level. One-sample proportion tests were used to assess differences in the proportion of biological mothers, and the proportions of ethnic groups.

Models were specified using *t.test*[33] function or *prop.test*[34] function, both in the base package in R.

Results

Table 14 summarises key demographics of the subsample of respondents who completed the first BabySteps tasks compared to all primary caregivers who participated in the COT20s study Wave 1 survey.

Table 17. Summary of key demographic and comparisons for respondents who completed the first BabySteps task and who complete Wave 1 survey

Demographic	BabySteps greenspaces task	COT20s wave 1	Results
Primary caregiver mean age (years)	31.3	31.7	$t(2116) = 2.69$, $p = 0.007$
Biological mothers (%)	96%	92%	$X^2(1) = 32.91$, $p < 0.001$
Ethnicity			
White	83%	76%	$X^2(1) = 51.66$, $p < 0.001$
Black or Black British	2%	5%	$X^2(1) = 21.44$, $p < 0.001$
Asian or Asian British	7%	11%	$X^2(1) = 18.43$, $p < 0.001$
Other/Mixed	7%	8%	$X^2(1) = 2.49$, $p = 0.11$
Mean annual family equivalised income	£28,770	£27,842	$t(1879) = -1.95$, $p = 0.05$
Median equivalent education qualification level	4	3	$t(2173) = -4.07$, $p < 0.001$

Differences between groups were statically tested, below describes significant differences between the subgroup of respondents who completed the first BabySteps task and the whole respondent group for the COT20s study.

---

[33] Example R code: *t.test(COT20s$age, Babysteps$age)*
[34] Example R code: prop.test(babysetps_proportion, overall_proportion).

There was a very small difference in age between primary caregivers who completed the greenspaces task in BabySteps and the whole sample, with those who completed the first task on average 31.3 years compared to 31.7 years in the whole COT20s sample.

Similarly, there was a small difference in the percentage of those who completed the BabySteps greenspaces task who were biological mothers of the cohort child compared to the whole COT20s sample. The whole sample had 4 percentage points fewer biological mothers than the subgroup of those who completed the BabySteps greenspaces task.

By ethnicity, there was an 8 percentage point difference between respondents who completed the BabySteps greenspaces task of White ethnicity compared to the whole COT20s sample. There was more than half the percentage of respondents of Black or Black British ethnicity in the BabySteps greenspaces subgroup compared to the whole COT20s sample. Similarly, there was a lower proportion of respondents who were of Asian or Asian British ethnicity in the BabySteps subgroup, with 4 percent fewer respondents of Asian or Asian British ethnicity who completed the BabySteps greenspaces task compared to the rest of the sample.

By Education level, those who completed the BabySteps greenspaces task were relatively more highly educated, with a median equivalent qualification at level 4 compared to level 3 for the whole COT20s sample.

In summary, the group of respondents who completed the BabySteps greenspaces activity somewhat demographically differed from the whole COT20s sample. Particularly, those who completed the BabySteps greenspaces activity were relatively less ethnically diverse. They also tended on average to have slightly higher levels of education than the whole COT20s sample. Further, compared to those who completed the BabySteps greenspaces activity, primary caregivers in the whole COT20s sample tended to be slightly older and contained a marginally smaller proportion of biological mothers of the cohort child. The two groups did not vary significantly by family income.

The identified differences between those who completed the BabySteps greenspaces activity and the whole cohort highlight that, although findings from the 'How do you use greenspaces?' are informative, they are slightly less representative of the population than the overall COT20s sample.

Appendix 10: Language comprehension by age

As the cohort children's age at the time of the interview ranged between 8 months and 14 months, the relationship between age and language comprehension in the cohort was explored. The number of words *understood* by the cohort children increased with age, as expected. Table 15 displays word comprehension over the ages of the cohort children.

Table 18. Mean number of words cohort children understand, across month of age out of 51 common English words

Age (months)	Number of children	Mean number of words cohort child understands (*SD*)
8	1507	12 (11.3)
9	3650	13 (11.4)
10	1917	15 (12.3)
11	1177	17 (12.8)
12	235	21 (14.1)
13-14	179	24 (15.3)

Base: All cohort children. Table shows mean and standard deviation for number of words per month of age   Source: COT20s wave 1

Appendix 11: Analysis comparing COT20s and CDI norm-reference language development

At 9 and a half months, children were reported by their primary caregivers to understand an average of 14 words from the set of 51 provided (note this figure should not be taken to directly estimate the total number of words a child understands). The number of words the COT20s children were reported to understand was compared to the number of words understood by children from the CDI UK population-representative pre-pandemic dataset (Alcock; 2020 [35]) to determine the population repetitiveness of the current cohort's language development.

Methodology

The reference dataset was publicly available and downloaded from the UK Data Service (Alcock; 2020). A subset of children who were of the same age to the majority of the COT20s cohort sample (children aged older than 8 months and less than 11 months) was selected from the reference dataset. A t-test was conducted to check that there was no significant difference in age between the COT20s sample and the reference sample (see below).

In total, a subset of 351 from the CDI data were selected for the comparison analysis. It should be noted that although this comparison sample has fewer cases than the current cohort dataset, the reference sample was broadly population representative and, importantly, was obtained prior to the COVID-19 pandemic (between 2012 and 2016).

To assess whether the current cohort's language development differed from that of the CDI reference group, t-test were conducted to determine if there was a significant difference between the mean number of words understood by the cohort and the CDI reference subset. Additional analysis was done to determine if the current cohort differed from the CDI reference group in age and indices of multiple deprivation quintiles (IMD). Associations were considered significant at 5% threshold (p-values 0.05).

All analysis was conducted using R (R Core Team; 2021). Models were specified using *t.test* function [36].

Results

The t-test revealed there was not significant difference between the COT20s and CDI-reference group in:
- The number of words understood: $t(383) = -0.46$, $p = 0.65$.
- Age: $t(406) = -1.34$, $p = 0.18$.
- IMD: $t(375) = -1.00$, $p = 0.32$.

---

[35] Alcock, K. (2020). *The UK communicative development inventory database: words and gestures ages 8-18 months 2012-2016.* [data collection]. UK Data Service. SN: 853687. https://doi.org/10.5255/UKDA-SN-853687

[36] Example R code: *t.test(COT20s$word_understood, CDI$ word_understood)*

Appendix 12: Number of words by frequency and type of home learning activities/interactions

Figure 6 and 7 demonstrates that for all 11 activities and interactions, children whose primary caregiver engaged them in that activity several times a day understood on average more words than those who never did each of these activities.

Figure 3. Mean number of words cohort children understand by frequency of engagement in each home learning activity/interaction
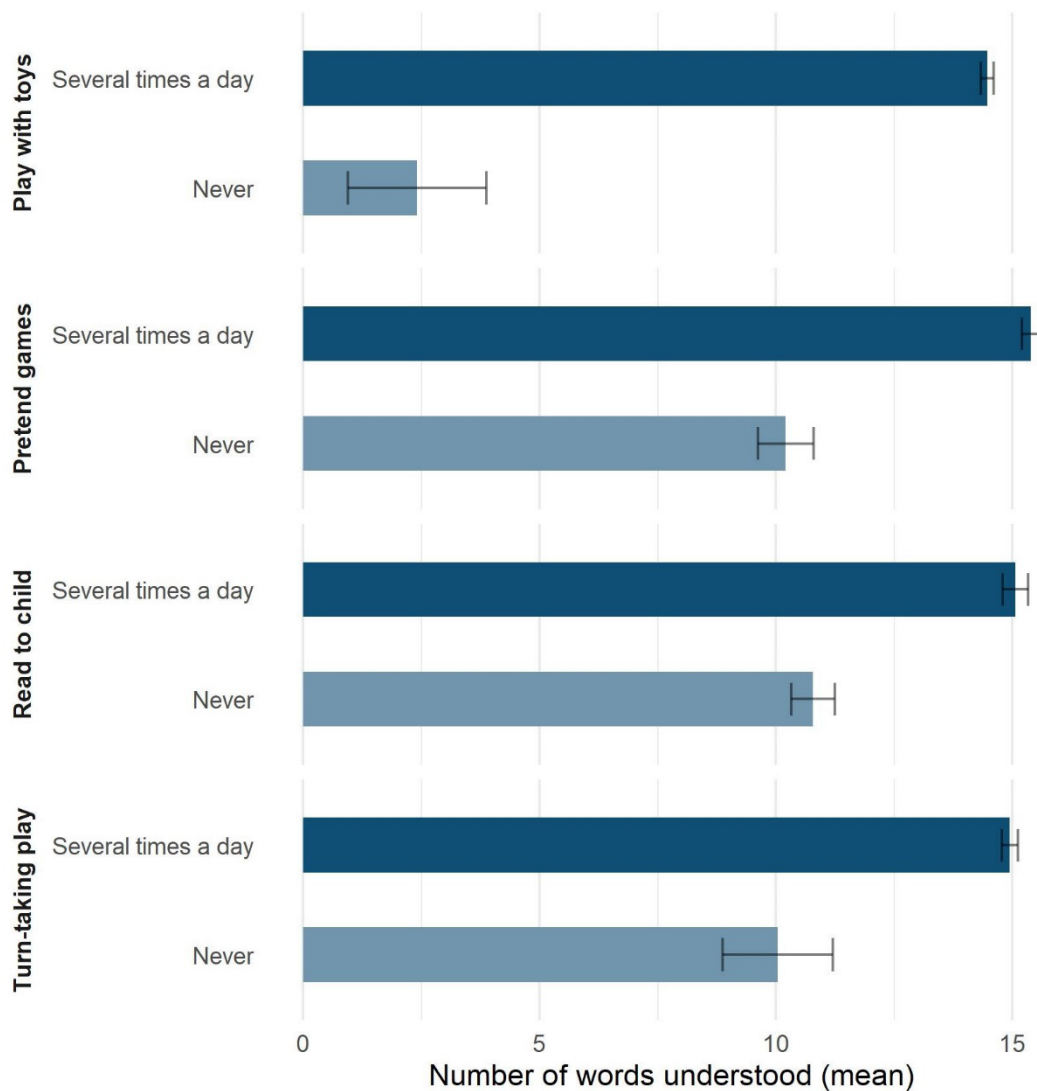
Figure 4. Mean number of words cohort children understand by frequency of engagement in each home learning activity/interaction
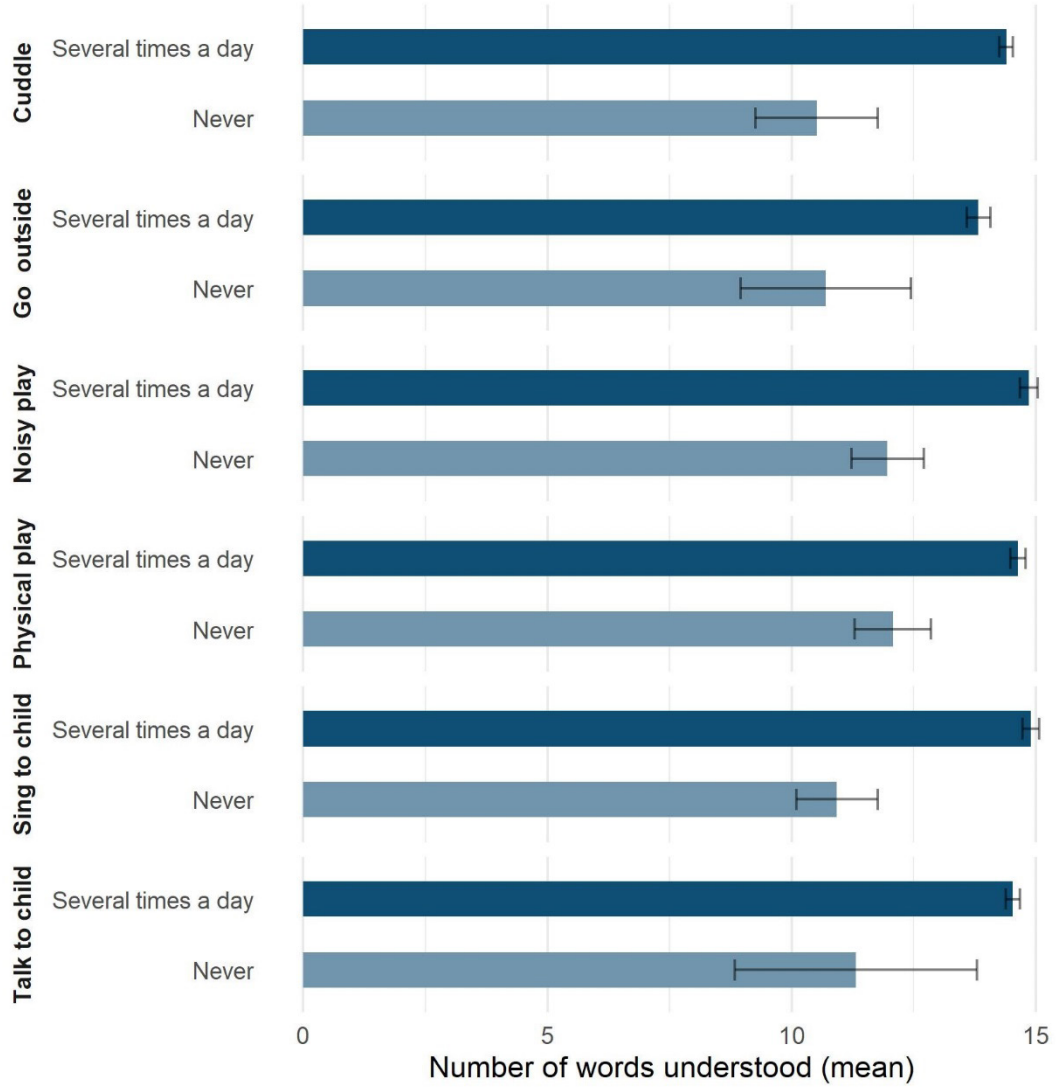
Appendix 13: Number of times each professional and service was used

Table 19. Percentages of families using each service by number of times used

Number of times visited	Health visitor	Midwife	GP	Baby Classes	Play sessions	Breastfeeding support
Never	3	12	13	62	63	75
1	17	15	21	2	2	9
2	33	17	21	1	2	7
3	20	22	18	1	1	4
4	9	9	10	1	1	2
5	6	6	7	2	2	2
6	4	3	3	2	1	1
7	1	1	1	1	1	<1
8	1	1	1	1	1	<1
9	1	<1	<1	<1	<1	<1
10	6	4	4	27	26	2
Unweighted Base	8486	8476	8500	8534	8534	8538
Weighted Base	8482	8473	8497	8522	8522	8525

Base: All cohort children. Table shows percent of number of visits.   Source: COT20s wave 1

Appendix 14: Access issues to health visitors and GPs across regions

Table 20. Percentages of families reporting access issues to health visitors across regions

Region	Percentage (%)
South East	4
Yorkshire and The Humber	4
North West	4
London	4
East Midlands	6
North East	6
East of England	6
South West	7
West Midlands	7

Base: All families. Table shows % within region.   Source: COT20s wave 1

Table 21. Percentages of families reporting access issues to GP across regions

Region	Percentage (%)
Yorkshire and The Humber	3
North East	4
South East	4
North West	4
London	5
East Midlands	6
South West	7
West Midlands	7
East of England	7

Base: All families. Table shows % within region.   Source: COT20s wave 1

Appendix 15: Services used accessed via a family hub

Table 22. Percentages of families using each service and professional with weighted and unweighted bases

Professional/Service	Of total respondents accessing service through FH (%)	Of those who used professional/service accessing through FH (%)	Unweighted Base	Weighted Base
Playgroup or play sessions	4	12	3118	3153
Health visitor	4	4	8357	8346
Baby Classes	3	9	3238	3275
Breastfeeding Support	2	9	2176	2189
Infant weight and growth	2	15	1213	1214
Midwife	1	2	7589	7571
Infant feeding support/weaning/nutrition	1	11	927	914
Baby and infant health advice and support	<1	15	408	411
Family Support Worker / Early Help Worker	<1	17	194	188
Mental health support	<1	4	645	646
Parenting support/parenting classes	<1	15	172	172
Infant sleep support	<1	7	229	230
Family relationships support	<1	6	126	126
Money or debt advice and support	<1	6	103	107
Housing advice and support	<1	4	140	140
Other	<1	8	24	25
Drug and alcohol support	<1	20	9	10
Advice and services for my child's disability or learning needs	<1	2	45	43
Jobs and training advice and support	0	0	30	31
Unweighted Base	8560	-	-	-
Weighted Base	8547	-	-	-

Base: All cohort children. Table shows %   Source: COT20s wave