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Mother's perception of general family functioning and sugar consumption of 3- and 4-year-old children

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1 Mother's perception of general family functioning and sugar consumption of 3 and 4 year old
2 children: the ELF study.

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26

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27 Abstract

28 Frequent consumption of sugary foods is a common risk factor for chronic diseases such as
29 dental caries and obesity. Dietary patterns are acquired at home during early life and form a
30 blueprint for dietary behaviours in later life. A favourable family environment can provide a
31 supportive context that enhances the adoption of healthy dietary habits. The aim of this
32 study was to identify the contribution of general family functioning towards the frequent
33 consumption of sugary foods by three and four year old children in Outer North East London.
34 The research question was explored with data from the ELF study, which collected data
35 through home visits from a representative sample of adults and children living in Outer North
36 East London in 2008-10. This study analysed data from 698 three and four year old children
37 and their mothers and included logistic regression, conceptual hierarchical modelling and
38 mediation analysis. The results showed that 17% of the sample consumed sugary foods
39 more than four times day; and that effective general family functioning may help reducing
40 frequent consumption of sugary foods. There was a 67% reduction in children's frequent
41 consumption of sugary foods with every unit increase in the general family functioning score.
42 Mother's higher education may also help reducing frequent consumption of sugary foods by
43 children. The negative impact of mother's lower education was buffered by the effect of
44 effective general family functioning. The study findings underscore the prospect of identifying
45 factors that contribute to the acquisition of good dietary behaviours.

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50 Introduction

51 The WHO has long advocated the common risk factor approach. This enables a large
52 number of chronic diseases to be targeted by focusing on a small number of risk factors.
53 This improves efficiency and effectiveness and lowers the costs involved in promoting health
54 [Grabauskas, 1987; Sheiham and Watt, 2000; World Health Organisation, 1980]. The high
55 consumption of sugary foods is one such risk factor and is common to chronic diseases such
56 as dental caries and obesity, including its associated comorbidities of heart disease,
57 hypertension, stroke, and diabetes [Brynes et al., 2003; Ebbeling et al., 2002; Moynihan,
58 2005; World Health Organisation, 2003]. Furthermore, a focus on diet is relevant because it
59 is a modifiable behaviour.

60 Socio-economic position (SEP) influences multiple outcomes, including oral health, and
61 impacts negatively on disease outcomes in a number of ways. Furthermore it involves
62 access to resources to avoid risk and minimise the consequences of disease, and this socio-
63 economic disadvantage repeats over time because higher socio-economic groups are better
64 equipped to benefit from new knowledge [Phelan et al., 2010]. It is essential to choose
65 socioeconomic position indicators appropriate to the aims of a study, because different
66 measures involve different pathways and have varying degrees of association with different
67 health behaviours [Singh-Manoux et al., 2002]. Education is a good proxy for SEP because it
68 is associated with occupation and income [Galobardes et al., 2006]. In addition, education is
69 a relevant variable for measuring variation in SEP across ethnic groups [Kelaheer et al.,
70 2008]. It is well established that a poor dietary pattern in children, including diets rich in
71 sugar, is highly correlated with parents' low level of education [North and Emmett, 2000;
72 Northstone and Emmett, 2005]. Turrell and Kavanagh [2006] demonstrated that mothers'
73 education guides their knowledge about different foods. This determines the types of foods
74 that they buy, which influences children's exposure to these foods, affecting their preference;
75 and, ultimately, their sugar consumption habits.

76 Dietary patterns are acquired at home during early life [Benton, 2004] which, in accordance
77 with the life course theory, forms a blueprint for dietary behaviours in later adolescent and
78 adult life [Fisher-Owens et al., 2007; Mattila et al., 2005; Nicolau et al., 2003]. Families are
79 in a unique position as they are responsible for instilling the initial values, attitudes, beliefs
80 and behaviours in young children. This forms the backbone on which rests their ability to
81 behave in a health-promoting manner in later years [Benton, 2004; Blinkhorn et al., 2001].
82 Furthermore, a favourable family environment may provide a supportive context in which to

83 enhance the adoption of healthy dietary habits [Benton, 2004; Rhee, 2008; Ryan et al.,
84 2005].

85 Previous studies have focused on the importance of parental psychosocial factors, including
86 cognitive aspects such as knowledge, attitudes and parental self-efficacy, to instil healthy
87 behaviours and establish healthy routines [Adair et al., 2004; Finlayson et al., 2007; Lencova
88 and Duskova, 2013]. In recent years, the shift towards positive medicine has seen the
89 identification of health “protective” factors gain prominence. Therefore, further understanding
90 of the role of family functioning on diet offers opportunities to identify factors, within the
91 family environment, that contribute to the acquisition of good dietary behaviours.

92 Family functioning can be studied in many different ways. This study focuses on whole
93 family functioning as it is more inclusive than focusing solely on parenting styles or parental
94 modelling of behaviour [Renzaho et al., 2011]. Current definitions of ‘effective family
95 functioning’ include the family’s ability to face challenges that arise as part of a family’s life
96 cycle; to have clear and direct communication between members; to have flexible rules in
97 order to regulate family behaviour; to define clearly the roles and responsibilities of its
98 members; and to have warm, affectionate relationships [Ryan et al., 2005]. The aim of this
99 study was to assess whether effective general family functioning contribute to the acquisition
100 of good dietary behaviour among three and four year old children living in a deprived area of
101 London. Also, the study sought to assess whether effective family functioning can act as a
102 buffer against the detrimental effects of having lower education and belonging to minority
103 groups.

104 Methods

105 This study is part of the East London Family (ELF) study, which is a two generation cross-
106 sectional family study including a representative sample of children aged 3 and 4 (n=1,174)
107 and adults 16-65 years old (n=2,343) living in Waltham Forest, Redbridge, and Barking and
108 Dagenham in 2009-10, in order to investigate the importance of family functioning for oral
109 health [[http://www.dentistry.qmul.ac.uk/research-listing/32-patient-and-population-orientated-
110 research/294-one-family-study](http://www.dentistry.qmul.ac.uk/research-listing/32-patient-and-population-orientated-research/294-one-family-study)]. The Outer North East London Research Ethics Committee
111 approved the ELF study protocol (REC Reference Number: 08/H0701/93).

112 A sub-sample of participants was drawn from the ELF study for this study on mother’s
113 perception of family functioning and sugar consumption by their three and four year old

114 children. The ELF study conceptualized families according to the Family System Theory as
115 dynamic systems of family members who interact with one another, aiming to adjust to the
116 developmental needs and maintenance of their members. The family system comprises
117 dyadic subsystems, such as parent-child, partner-partner and sibling-sibling relationships
118 [Whitchurch and Constantine, 1993]. This study focused on the mother-child dyadic.

119 The minimum sample size for this sub-study was estimated to be 644. This sample size
120 provided 90% statistical power to identify an odds ratio of 0.70 for the association between
121 one unit change in general family functioning score and children's high frequency of
122 consumption of sugary foods. The calculation assumed that 15% of children consume
123 sugary foods more than four times per day at the mean value of the explanatory variable
124 (general family functioning), α equal to 0.05, and β equal to 0.10.

125 The ELF study adopted a stratified random sampling approach to select a representative
126 sample of the general non-institutionalised population. The sampling frames were lists of all
127 addresses in each of the wards (n=58) in Waltham Forest, Redbridge, and Barking and
128 Dagenham. A minimum of 55 addresses were randomly selected from each ward to yield
129 3,193 addresses. Residents in these addresses were then contacted by post, and invited to
130 participate in the study. Vacant addresses, commercial premises, and households with
131 ineligible residents (e.g.: outside the age range of interest) were excluded. The maximum
132 number of adults and children invited to participate per household were two and one
133 respectively.

134 Adult participants completed two structured questionnaires in their own homes, and provided
135 information about themselves and their children. Trained interviewers administered the
136 questionnaires. The child questionnaire included questions about the child's demographics
137 (age and sex) and diet. The frequency of children's sugar consumption was assessed using
138 a modified version of the food frequency questionnaire (FFQ), used in the National Diet and
139 Nutrition Survey for children aged 1 ½ to 4 ½ years [Hinds and Gregory, 1995]. The adult
140 questionnaire included socio-demographic characteristics (age, gender, marital status,
141 education and ethnicity) and family functioning. Family functioning was measured using the
142 Family Assessment Device [Epstein et al., 1983]. The Family Assessment Device was
143 chosen because it was a validated instrument with cross cultural applicability (Miller et
144 al.,1985; Byles et. al., 1988), as it has been translated into over 20 languages and been
145 applied across cultures (Ryan et al.,2005; Herzer et al.,2010). The address postcode was

146 used to derive the Index of Multiple Deprivation (IMD), which was used as an indicator of a
147 family's levels of social and material deprivation.

148

149 Data analysis

150 ELF data was weighted to adjust for the unequal probability of selection and non-response,
151 in order to produce a representative sample with respect to age, gender and ethnicity based
152 on the UK Census of 2001 [Office for National Statistics, 2001]. A sub sample of 698 mother-
153 child dyads was included in this data analysis. The criterion for entry into this sub-study was
154 mother-child dyads (n=908) with complete data (n=698) on variables needed to explore the
155 study's aims. Data were analysed using STATA/IC 11 [StataCorp, 2009] to take into account
156 the complex survey design (stratification and clustering); and to produce corrected standard
157 errors and confidence intervals.

158 Mean family functioning domain scores were calculated for each of the six domains only
159 when a minimum of 60% of the questions relating to that domain were answered. If more
160 than 40% of the items for a domain were missing, that domain score was designated as
161 missing and the subject was not included in the analysis. General family functioning was
162 treated as a continuous variable.

163 The variable relating to mother's education was divided into two categories: 'higher
164 education' and 'less than higher education'. Information on mother's ethnicity was
165 categorised into four main groups: White, Asian, Black and Mixed/Others. Information on
166 mother's marital status was divided into the following categories: 'living alone' (single,
167 separated, widowed, and divorced); and 'living with a partner' (married, re-married,
168 cohabiting) [Office for National Statistics, 2005]. The IMD was categorised into quintiles
169 based on the distribution for England; and each family was assigned to a quintile based on
170 the residential postcode. For the purpose of analysis, the sample was further divided into
171 'less deprived' and 'more deprived', based on relative deprivation for the whole of England.
172 The first three quintiles were relatively 'less deprived' areas while the last two quintiles were
173 relatively 'more deprived' areas.

174 'Sugar consumption frequency' refers to how often a child eats/drinks commonly available
175 sugary foods which are potentially damaging to children's teeth (such as chocolate, biscuits

176 or cookies, cakes, confectionary or other sweets, sweetened milk, sweetened fruit juice and
177 sweetened fizzy drinks) [Hinds and Gregory, 1995]. Responses were collected using 7-point
178 ordinal scales ('more than once a day', 'once a day', 'most days', 'at least once a week', 'at
179 least once a month', 'less than once a month', and 'never'). The responses for each sugary
180 food item were transformed into a daily equivalent and the daily equivalents were added up
181 to give an estimate of the daily frequency of consumption of sugary foods. A response of
182 'more than once a day' was conservatively estimated to mean 'twice a day' and given a
183 value of two per day; 'once a day' was given a value of one; 'most days' was estimated as
184 consumption of that sugary food item at least four days out of seven and was given a value
185 of $0.57(4 \div 7)$ per day; a response of 'once a week' was estimated as consumption of that
186 item once in seven days and given a value of $0.14(1 \div 7)$ per day; and responses indicating
187 consumption of the sugary food 'once a month' or less was given a value of zero. If up to two
188 responses for sugary foods were missing then the mean value of the other items was
189 imputed. Children were then divided into two groups: those consuming four or more sugary
190 foods per day; and those consuming less than four sugary foods a day. This threshold was
191 established based on international dietary guidelines for the reduction of the risk of
192 developing dental caries [Department of Health/British Association for the Study of
193 Community Dentistry, 2009; Moynihan and Petersen, 2004; Moynihan, 2005; Sheiham,
194 2001; World Health Organisation, 2003].

195 Simple logistic regression analyses were carried out to assess the unadjusted association
196 between each of the study variables (children's age and sex; mother's ethnicity, marital
197 status, education; IMD; and general family functioning) and children's consumption of sugary
198 foods more than four times per day. In accordance with the lax criterion [Altman, 1994],
199 explanatory variables that were not statistically significant related to the outcome at the level
200 of 0.20 were excluded at this stage. Thereafter, conceptual hierarchical modelling [Victora et
201 al., 1997] was carried out. Age, gender and socio-economic variables were entered in the
202 regression equation due to their well-known strong association with sugar consumption.
203 Variables were included sequentially as follows: (1) age, gender and mother's ethnicity; (2)
204 age, gender, mother's ethnicity plus IMD and mother's education; (3) age, gender, mother's
205 ethnicity, IMD, mother's education plus general family functioning. Odds Ratios (OR) were
206 reported and the 95% confidence interval was considered. Attenuation of the OR was
207 calculated using the formula:- $(ORU - ORA) \div (ORU - 1)$ [Birkmeyer et al., 2003], where ORU
208 represents the odds ratio before including the family functioning score; and ORA reflects the
209 odds ratio after including family functioning in the model. Finally, mediation analysis was
210 carried out following the Baron and Kenny (1986) approach.

211

212 Results

213 The ELF study response rate was 67.9% for children and 56.8% for adults. The average
214 number of adults and children recruited per household was 1.3 and 1.1 respectively. The
215 mother-child dyads study sub-sample comprised 698. The characteristics of the study sub-
216 sample (Table 1) shows that 3 and 4 year old children were fairly equally distributed by age
217 and sex. Only 2% of the sample were categorised into the 'least deprived' quintile reflecting
218 the population distribution reported in the last Census [Office for National Statistics, 2001],
219 which conveys the relative high levels of deprivation of this area. Fifty seven per cent of the
220 mothers were White; 26% were Asian; 11% were Black; and 6% were mixed or other
221 ethnicities. The majority of the mothers (80%) lived with a partner. Forty five per cent of the
222 mothers reported a lower educational qualification. Seventeen per cent of the children in the
223 sub-sample consumed sugary foods more than four times per day. The mean score for
224 general family functioning in the sub-sample was 3.16. General family functioning scores can
225 range from 1 to 4, with higher scores reflecting better family functioning.

226 The results of simple logistic regression showed that both mother's higher education and
227 effective family functioning were associated with low sugar consumption, which suggested
228 that these factors contributed to the acquisition of good dietary behaviour. Children whose
229 mothers reported higher education were significantly ($p=0.001$) 59% (OR 0.41; 95% CI:
230 0.25,0.68) less likely to consume sugary foods more than four times per day compared to
231 children whose mothers reported lower qualifications. Similarly, effective general family
232 functioning was highly significantly associated with lower consumption of sugary foods by
233 children. There was a 77% reduction in children's chances of consuming sugary foods more
234 than four times per day for every unit increase in the general functioning score, where higher
235 scores indicate more effective general family functioning (Table 2).

236 Although not significant, the associations for age, sex and IMD were in expected directions,
237 with boys, four year olds and children living in more deprived areas being more likely to
238 consume sugary foods more than four times per day by comparison with girls, three year
239 olds and children living in less deprived areas. Children with Asian mothers were significantly
240 2.69 times more likely to consume sugary foods frequently compared with children with
241 White mothers (95% CI: 1.53, 4.74). Hierarchical modelling confirmed that children with
242 Asian mothers were significantly 3.46 times more likely to consume sugary foods more than

243 four times per day (95% CI: 1.63, 5.25) compared with children with White mothers, after
244 adjusting for age, gender, mother's education and IMD.

245 Hierarchical modelling (Table 3) confirmed the highly significant association between
246 effective general family functioning and the consumption of sugary foods more than four
247 times per day. There was a 67% reduction in children's frequent consumption of sugary
248 foods with every unit increase in the general family functioning score. This association was
249 independent of mother's education, mother's ethnicity, level of deprivation, children's age or
250 sex. Hierarchical modelling also confirmed that mother's higher education had a positive
251 influence against consumption of sugary foods more than four times per day by children.
252 Children whose mothers had a higher qualification were 65% less likely to consume more
253 than four intakes of sugary foods (OR 0.35; 95% CI: 0.21, 0.58) compared with children
254 whose mothers reported lower qualifications, after adjusting for age, gender, mother's
255 ethnicity and IMD.

256 The results of mediation analysis suggested that effective family functioning may have a
257 buffer effect on the negative impact of lower education on sugar consumption. When tested
258 for mediation, using the four steps proposed by Baron and Kenny (1986), it was found that
259 this relationship was partially mediated through general family functioning. The association
260 was attenuated by 9% when general family functioning was added to the model indicating
261 that part of the association between mother's education and children's sugar consumption is
262 potentially mediated through general family functioning (Table 3, model 3).

263 Similarly, the association between high sugar consumption and children with Asian mothers
264 was attenuated by 16% when general family functioning was added to the model (Table 3).
265 When tested further for mediation [Baron and Kenny, 1986], it was confirmed that this
266 relationship was partially mediated through general family functioning.

267 **Discussion**

268 The main finding of this study is that effective general family functioning may contribute to
269 the acquisition of good dietary behavior of three and four year old children in East London, a
270 multicultural and deprived area of the UK. The positive influence of effective general family
271 functional on sugar consumption is plausible. First, the day to day functioning of families
272 provides the best context within which specific rules are established regarding three and four
273 year old children's health behaviours, including sugar consumption behaviours. Positive

274 social interactions enhance the adoption of healthy dietary habits [Benton, 2004]. Therefore,
275 the favourable atmosphere created by effective general family functioning may facilitate
276 better acceptance of rules by children and enhance their ability to behave in a health
277 promoting manner [Rhee, 2008]. On the other hand, ineffective functioning could lead to
278 problems, including the adoption of unhealthy behaviours [Ryan et al., 2005].

279 To our knowledge, this is the first study which demonstrates the relationship between
280 effective general family functioning (as measured by the FAD), and low sugar consumption.
281 Nevertheless, this finding corroborates the wider, but related, literature on the link between
282 effective family functioning and children having a healthy calorie intake, eating breakfast and
283 consuming more fruit and vegetables [Kitzman-Ulrich et al., 2010; Renzaho et al., 2011]. On
284 the other hand, ineffective family functioning has been linked to eating disorders [Emanuelli
285 et al., 2003] and obesity in children [Chen and Kennedy, 2005]. The findings of this study
286 support the idea that effective family functioning is more important for the health of family
287 members than the family structure *per se* [Fisher-Owens et al., 2007; Sweeting and West,
288 1995; World Health Organisation, 2004].

289 The importance of family-based programmes in reducing childhood obesity has been
290 recognised [Kitzman-Ulrich et al., 2010]. However, there has been a lack of upstream
291 interventions targeted at improving the home environment [Flynn et al., 2006]. Frequent
292 sugar consumption seldom occurs in isolation and is often an indicator of the larger dietary
293 picture, which affects a multitude of chronic diseases. Family functioning is modifiable and is
294 therefore amenable to interventions. Our findings suggest that improving family functioning
295 could equip families with resources that encourage healthy behaviours, even in the presence
296 of less than optimal social and economic circumstances. Furthermore, an intervention aimed
297 at improving family functioning may have enormous potential to improve the quality of family
298 life in a whole range of areas. By equipping the family with skills to handle their day to day
299 lives, health-related behaviours become embedded in daily activities, and therefore become
300 sustainable even in the midst of adversity. In addition, interventions at the family level have
301 the ability to influence outcomes at whole population levels [National Institute For Health and
302 Clinical Excellence, 2007]. This underpins the importance of influencing family environments
303 positively. An increase in the general family functioning score by just one unit has the
304 potential to reduce children's chances of consuming sugary foods frequently by 67%.
305 Therefore, an intervention to improve general family functioning has significant potential to
306 reduce the risk of children developing unhealthy dietary behaviours and promote health
307 effectively.

308 The main limitation to studying sugar consumption is related to its measurement. Food
309 frequency questionnaires (FFQs) offer a cost-effective and appropriate means of assessing
310 habitual long-term diet and are relatively easy to use [Cade et al., 2002]. However, the
311 validity of FFQs have been challenged, with the suggestion that they are susceptible to recall
312 bias and to underreporting of frequency of consumption of foods that project an unhealthy
313 image [Gibson and Williams, 1999]. This has been addressed by validating FFQs by
314 comparing them with dietary diaries and weighted intakes [McNeill et al., 2009]. This study
315 adopted a conservative approach to the calculation of daily sugar consumption frequency;
316 and it is more likely that frequent consumers were misclassified as low frequency consumers
317 than the reverse.

318 Other potential limitations of this study are related to the obtaining information by self-
319 reports; the presence of incomplete data; and the cross-sectional nature of the study design.
320 Respondents may have felt embarrassed to reveal private details of their life; answers may
321 have been influenced by the person's feelings at the time they filled out the questionnaire;
322 and subjects may have forgotten pertinent details of their relationship. It is also possible that
323 answers were influenced by social desirability bias. There was minimum manipulation of the
324 data and good completeness of data. It is unlikely that missing data have influenced the
325 findings. Cross-sectional data do not allow causal inferences to be drawn because of the
326 difficulty in establishing temporal relations. This design is recommended for the exploration
327 of associations between the risk factors and the outcome of interest, if there is limited
328 research to support the hypothesis. Furthermore, it is more likely that family functioning has
329 affected sugar consumption than the reverse causality. The findings of this cross-sectional
330 study are relevant to the further understanding the complex process that underpins the
331 development of children's sugar consumption behaviours. Once a clear understanding of this
332 association is established, further research should be carried out adopting a randomised
333 controlled trial design.

334 In conclusion, a mother's perception of effective general family functioning (defined as a
335 family that is able to manage daily life and resolve problems in the context of warm and
336 affective family interactions, through clear communication, well-defined roles and flexible
337 behaviour control), has a significant protective effect against high frequent intakes of sugary
338 foods by their three and four year old children.

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346 patient-and-population-orientated-research/67-oral-health-needs-assessment](http://www.dentistry.qmul.ac.uk/research-listing/32-patient-and-population-orientated-research/67-oral-health-needs-assessment)). ELF is an
347 extension of the ELOHI study. The funders had no role in the study design, data collection
348 and analysis, decision to publish, or preparation of the manuscript.

349 **AUTHORS CONTRIBUTION**

350 All authors contributed to selection of key covariates, wrote and reviewed the manuscripts.
351 SN and WM analysed the data. WM conceived of the study, oversaw the implementation
352 and conducting of the fieldwork and provided overall guidance.

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493 [Legends](#)

494 Table 1. Characteristics of the study sub-sample

495 Table 2. Simple logistic regression models for the relationship between children's age, sex,
496 mother's ethnicity, mother's marital status, mother's education, Index of Multiple Deprivation
497 and General family functioning, and consumption of sugary foods more than four times per
498 day by three and four year old children in the study sub sample

499 Table 3. Hierarchical logistic regression models for the association between socio-
500 demographic variables and general functioning, and the consumption of sugary foods more
501 than four times per day by three and four year old children in the study sub sample.

502 Table 1.

Variables (N=698)	Frequency	Weighted Proportion
Age:		
3 years	359	49%
4 years	339	51%
Gender:		
Male	356	47%
Female	342	53%
Mother's ethnicity:		
White	253	57%
Asian	225	26%
Black	200	11%
Mixed/Others	20	6%
Mother's marital status:		
Living alone	131	20%
Living with a partner	567	80%
Mother's Education:		
Lower qualification (None, Secondary school, technical)	303	45%
Higher qualification (A levels, university, postgraduate)	395	55%
IMD		
Less deprived (IMD score \leq 21.22)	127	28%
More deprived (IMD score \geq 21.23)	571	72%
Children consuming sugary foods more than four times per day	122	17%
General family functioning	Mean	(95% CI)
	3.16	(3.12, 3.20)

503

504 Table 2.

Variables (N=698)	Odds Ratio (95% CI)	P value
Age: 3 years 4 years	1 1.58 (0.97,2.58)	0.07
Sex: Male Female	1 0.70 (0.42,1.17)	0.17
Mother's Ethnicity: White Asian Black Mixed/Other	1 2.69 (1.53,4.74) 1.29 (0.68,2.45) 1.43 (0.34,6.04)	0.001 0.43 0.63
Mother's marital status: Living alone Living with a partner	1 1.22 (0.61, 2.43)	0.58
Mother's Education Lower (None, Secondary school, technical) Higher (A levels, university, postgraduate)	1 0.41 (0.25, 0.68)	0.001
IMD Less deprived (1st, 2nd, 3rd quintile) More deprived (4th, 5th quintile)	1 1.87 (0.89, 3.90)	0.10
General family functioning	0.23 (0.11, 0.46)	<0.001

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512 Table 3.

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Age: 3 years 4 years	1 1.49 (0.90, 2.49)	1 1.46 (0.87, 2.46)	1 1.54 (0.92, 2.59)
Sex: Male Female	1 0.70 (0.41, 1.18)	1 0.72 (0.42, 1.23)	1 0.72 (0.42, 1.23)
Mother's Ethnicity: White Asian Black Mixed/Other	1 2.61 (1.48, 4.61)*** 1.28 (0.68, 2.41) 1.43 (0.35, 5.86)	1 3.46 (1.63, 5.25)*** 1.24 (0.73, 2.66) 1.70 (0.42, 6.12)	1 3.06 (1.63, 5.72)*** 1.20 (0.61, 2.36) 1.54 (0.39, 6.11)
IMD: Less deprived More deprived		1 1.92 (0.89, 4.14)	1 1.79 (0.83, 3.87)
Mother's Education: Lower Higher		1 0.35 (0.21, 0.58)***	1 0.41 (0.23, 0.70)***
General Functioning			0.33 (0.15, 0.72)**

513

514 * p≤0.05, **p≤0.01, ***p≤0.001

515 Model 1: Adjusted for age, sex and mother's ethnicity

516 Model 2: Adjusted for variables in Model 1 plus mother's education and IMD

517 Model 3: Adjusted for variables in Model 2 plus family general functioning

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