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1 **Title:** Socioeconomic status and changes in appetite from toddlerhood to early childhood.

2

3 **Authors:** Alice R Kininmonth MSc<sup>1</sup>, Andrea D Smith PhD<sup>2</sup>, Clare H Llewellyn PhD<sup>2</sup>, Alison

4

Fildes PhD<sup>1,2</sup>

5 **Affiliations:**

6 <sup>1</sup> School of Psychology, University of Leeds, Leeds, United Kingdom

7 <sup>2</sup> Department of Behavioural Science and Health, University College London, Gower Street,

8 London WC1E 6BT, UK.

9

10 **Address correspondence to:** Dr Clare H Llewellyn. Email: [c.llewellyn@ucl.ac.uk](mailto:c.llewellyn@ucl.ac.uk). Tel: +44 (0)20

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12

## 13 **Abstract**

14

15 Understanding the mechanisms through which deprivation predisposes a child to increased  
16 obesity risk is key to tackling health inequality. Appetite avidity is a key driver of variation in  
17 early weight gain. Low socioeconomic status (SES) can be a marker of a more 'obesogenic'  
18 food environment which may encourage the behavioural expression of appetite avidity. The  
19 objective was to test the hypothesis that children of lower SES demonstrate increases in  
20 appetite avidity from toddlerhood to five years. Data were from the Gemini twin birth cohort,  
21 with one twin per family selected at random. Parents completed the Child Eating Behaviour  
22 Questionnaire (CEBQ) to assess appetitive traits at 16 months and five years. SES was  
23 defined using a weighted composite measure comprising seven key correlates. Linear  
24 regression models examined the cross-sectional and prospective associations between SES  
25 and appetite from 16 months to 5 years, controlling for appetite at 16 months, sex, birth weight  
26 and parental BMI. Cross-sectionally, lower SES was significantly associated with higher food  
27 responsiveness ( $\beta = -.09 \pm .024$ ), higher enjoyment of food ( $\beta = -.13 \pm .024$ ), lower satiety  
28 responsiveness ( $\beta = .09 \pm .024$ ), and lower food fussiness ( $\beta = .09, \pm .024$ ) at 16 months. At age  
29 5, lower SES was significantly associated with higher food responsiveness ( $\beta = -.10 \pm .032$ ),  
30 higher desire to drink ( $\beta = -.22 \pm .031$ ) and higher emotional overeating ( $\beta = -.10 \pm .032$ ).  
31 Prospectively, lower SES predicted greater increases in two key weight-related appetitive  
32 traits, from 16 months to 5 years: emotional overeating ( $\beta = -.10 \pm .032$ ;  $p < .01$ ) and food  
33 responsiveness ( $\beta = -.09, \pm .030$ ;  $p < 0.01$ ). The results indicate that appetite may be a  
34 behavioural mediator of the well-established link between childhood deprivation and obesity  
35 risk.

36

37 **Keywords:** Socioeconomic status, Child Eating Behaviour Questionnaire, Appetite,  
38 Childhood, Inequalities

39

40 **Abbreviations:** CEBQ, Child Eating Behaviour Questionnaire; SES, Socioeconomic status;  
41 BST, Behavioural Susceptibility Theory; BMI, Body Mass Index; SDS, Standard deviation  
42 scores; IMD, Index of Multiple Deprivation.

43 **Introduction**

44 Childhood obesity is a significant public health issue, and an important challenge for  
45 government and healthcare systems worldwide (PHE, 2015). There has been a consistent  
46 upward trend in rates of overweight and obesity in the UK since 2006, with 34.3% of children  
47 aged 10-11 classified as overweight or obese in 2017/18 (NHS, 2018). Excess bodyweight in  
48 childhood tracks into adolescence and significantly increases risk of cardiovascular disease,  
49 type 2 diabetes mellitus, and depression (Knai, Lobstein, Darmon, Rutter & McKee, 2012).  
50 The rise in obesity prevalence has been attributed to environmental changes that promote  
51 both the consumption of highly palatable, energy dense, convenience foods and physical  
52 inactivity (Rosenkranz & Dzewaltowski, 2008). There is a clear socioeconomic gradient to  
53 childhood obesity; in the UK, children from the most deprived areas are twice as likely to be  
54 classified as having overweight or obesity as those from the least deprived (Boodhna, 2014;  
55 PHE, 2018). Even in the first year of life, socioeconomic disadvantage has also been strongly  
56 linked to increased risk of obesity in adulthood (Gilman et al., 2018), which suggests the  
57 'obesogenic' nature of the early environment may contribute to health outcomes in later life  
58 (Knai et al., 2012; Claassen, Klein, Bratanova, Claes, & Corneille, 2019). The gap in health  
59 inequalities between the richest and poorest within society are ever-expanding (Stamatakis,  
60 Wardle, & Cole, 2010). It is important to identify the mechanisms underlying the relationship  
61 between socioeconomic status (SES) and childhood overweight/obesity to inform  
62 interventions aiming to reduce social inequalities in health.

63

64 Despite the ubiquity of the 'obesogenic' environment in wealthy countries, not everyone  
65 develops overweight or obesity, and variation in weight status is observed even at the level of  
66 the nuclear family. Behavioural susceptibility theory (BST) provides a biopsychosocial  
67 framework which seeks to explain why some of this variation occurs (Carnell & Wardle, 2007).  
68 BST proposes that obesity results from a combination of genetic susceptibility to overeating  
69 and exposure to an 'obesogenic' food environment that promotes excess consumption  
70 (Llewellyn & Fildes, 2017; Llewellyn & Wardle, 2015). Central to this theory is the hypothesis

71 that inherited individual differences in appetite act as behavioural mediators of an individual's  
72 genetic susceptibility to the 'obesogenic environment' (Carnell & Wardle, 2007; Llewellyn, van  
73 Jaarsveld, Johnson, Carnell, & Wardle, 2010; Llewellyn & Wardle, 2015). Twin studies have  
74 shown appetitive traits to be highly heritable (Carnell & Wardle, 2008; Llewellyn et al., 2010)  
75 and related to rate of weight gain in infancy and early childhood (Parkinson, Drewett, Le  
76 Couteur, & Adamson, 2010; Quah et al., 2015; Silje Steinsbekk & Wichstrøm, 2015; van  
77 Jaarsveld, Boniface, Llewellyn, & Wardle, 2014; van Jaarsveld, Llewellyn, Johnson, & Wardle,  
78 2011). 'Food approach' traits characterise a more avid appetite and a greater interest in food,  
79 and include food responsiveness, enjoyment of food, emotional overeating and desire to drink;  
80 these traits have been consistently associated with higher weight in childhood. 'Food  
81 avoidance traits' characterise a smaller appetite and a lower interest in food, and include  
82 satiety responsiveness, slowness in eating, emotional undereating and food fussiness; these  
83 have been consistently associated with lower weight in children (Carnell & Wardle, 2008;  
84 Llewellyn, van Jaarsveld, Johnson, Carnell, & Wardle, 2011; Steinsbekk, Llewellyn, Fildes, &  
85 Wichstrom, 2017; Steinsbekk & Wichstrom, 2015; van Jaarsveld et al., 2011). In accordance  
86 with BST, recent research has also demonstrated that the heritability of weight is significantly  
87 higher in children living in more obesogenic home environments compared to those from less  
88 obesogenic home environments (86% vs 39%), indexed according to structural and social  
89 characteristics of the food, physical activity and media environment within the home. This  
90 study demonstrated that children with greater genetic susceptibility to obesity are at greater  
91 'risk' of developing obesity when they grow up in environments that nurture the behavioural  
92 expression of an avid appetite (Schrempft, van Jaarsveld, Fisher, & et al., 2018).

93

94 Obesity risk may be greater among children from more deprived backgrounds because the  
95 environments they are exposed to encourage the behavioural expression of appetite avidity  
96 (Caldwell & Sayer, 2019). SES differences at both the neighbourhood level (e.g. density of  
97 takeaway outlets, access to green spaces) and individual level (e.g. education, income) are

98 associated with the types of foods readily available to children and the overall quality of their  
99 dietary intake (Claassen, Klein, Bratanova, Claes, & Corneille, 2019; Giskes et al., 2009;  
100 Stamatakis et al., 2010). Additionally, certain parental feeding practices, mealtime structure  
101 and stress/chaos within the home have been shown both to vary by SES and relate to  
102 children's appetite and obesity risk (Black, Moon, & Baird, 2014; Patrick & Nicklas, 2005).  
103 Recent work by Boswell, Byrne, and Davies (2018) revealed that psychosocial factors such  
104 as parental stress predicted higher child food cue responsiveness; with parental stress higher  
105 in low income households. It is hypothesised that parental stress may drive changes in the  
106 hypothalamic-pituitary-adrenal (HPA) axis that regulates appetite, thus resulting in the  
107 secretion of appetite-stimulating glucocorticoids and hedonic neural processes that may  
108 increase reward responsiveness to more palatable food cues (Boswell et al, 2018; Torres &  
109 Nowson, 2007). Furthermore, lack of structure around meal times, which is a common in low  
110 SES households, has been associated with lower enjoyment of food and lower satiety  
111 responsiveness in children (Finnane, Jansen, Mallan, & Daniels, 2017; Jansen, Williams,  
112 Mallan, Nicholson, & Daniels, 2018).

113

114 Despite the clear, and widening, social gradient in health outcomes, research is being  
115 hampered by a lack of consensus regarding the best way to measure SES (McLaren, 2007).  
116 Childhood SES is most frequently captured using a single indicator such as household income  
117 or parental education. The measures chosen vary between studies and are often used  
118 interchangeably, which can be problematic as each individual measure taps into a different  
119 phenomenon and individual measures do not capture the complexity of SES sufficiently. This  
120 highlights the importance of utilising comprehensive composite measures of SES that  
121 incorporate individual, household, and neighbourhood level factors.

122

123 Rationale

124 Understanding how childhood deprivation increases risk of excess weight gain is key to  
125 tackling health inequalities, but little is known about the specific mechanisms through which

126 SES increases obesity risk in early life. No previous studies have explored the link between  
127 appetitive traits and SES, and how variation in SES relates to the development of appetite in  
128 early childhood. We developed a comprehensive measure of SES and examined for the first  
129 time the cross-sectional and longitudinal associations between SES and a range of appetitive  
130 traits from 16 months to 5 years of age, using data from Gemini, a large population-based birth  
131 cohort of 2400 British families with twins born in 2007. We hypothesised that young children  
132 from more deprived families will develop a more avid appetite over time, which puts them at  
133 increased risk of obesity.

134

## 135 **Methods**

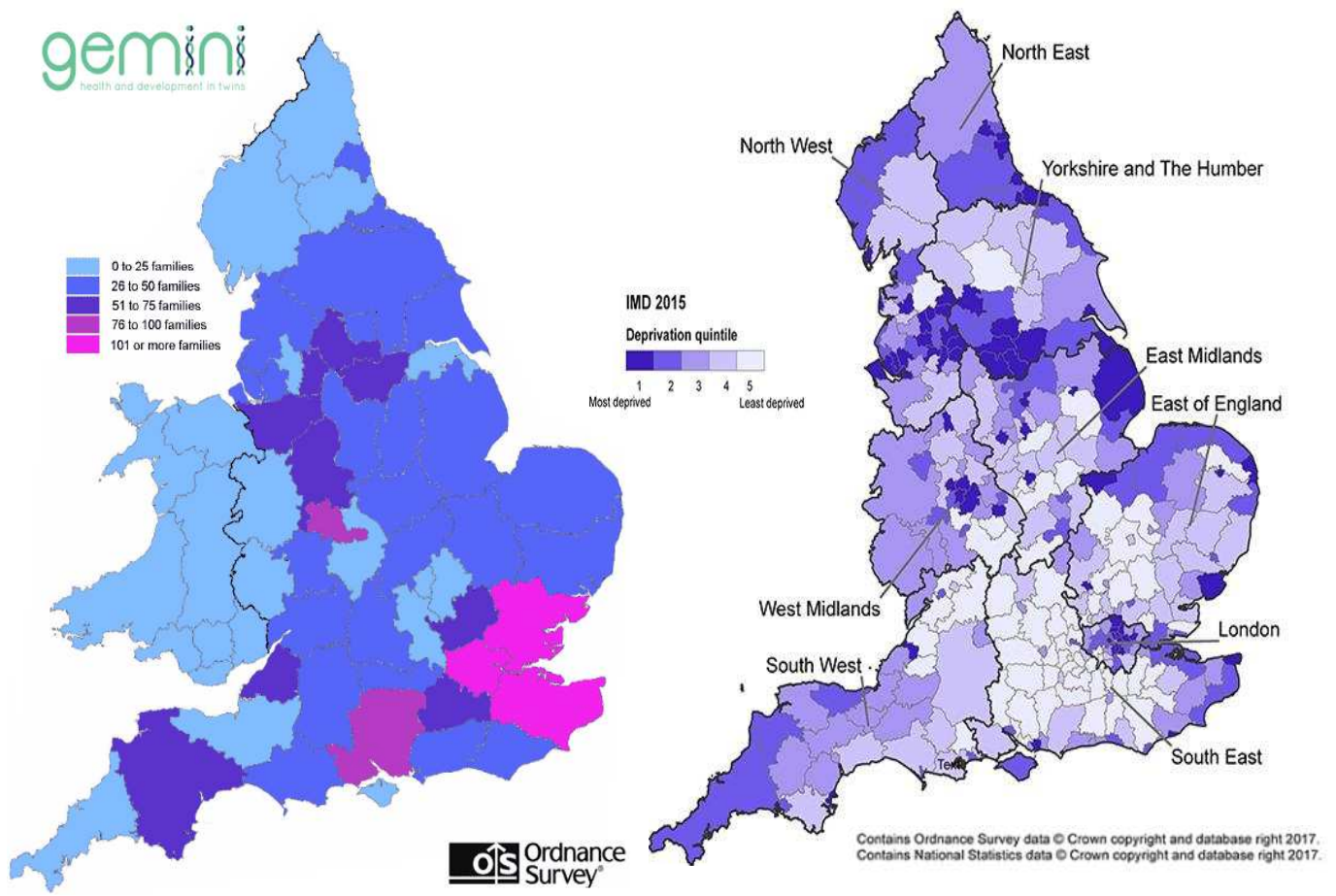
### 136 **Sample**

137 Participants were from the Gemini study, a longitudinal birth cohort of families with twins born  
138 in England and Wales between March and December 2007. In total, 2,402 families with  
139 monozygotic (identical) and dizygotic (non-identical) twins (n = 4804) consented to take part  
140 (van Jaarsveld, Johnson, Llewellyn, & Wardle, 2010). Figure 1 shows the distribution of  
141 Gemini families across the north and south of England and Wales. The geographical  
142 distribution of enrolled families mirrors that of the UK population (Wijlaars, Johnson, Jaarsveld,  
143 & Wardle, 2011). One twin from each family was selected at random for inclusion in the  
144 analyses to avoid clustering effects of twins in families. Participants in the present study were  
145 individual children with complete data on all variables included in the analysis (n = 941). Ethical  
146 approval was granted by the UCL Ethics Committee. Written informed consent was provided  
147 by Gemini families.

148



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161 **Figure 1.** Distribution of Gemini Twins across the United Kingdom shown in the map on the left  
162 (adapted from van Jaarsveld et al., 2010), while the map on the right shows the level of deprivation  
163 within the United Kingdom based on the index of Multiple Deprivation (Reproduced with permission  
164 from the Department for Communities and Local Government, 2015).

165  
166

**Measures**

167 Following recruitment, parents were asked to complete and return a series of postal-  
168 questionnaires at key developmental timepoints. These analyses used data collected at  
169 baseline when the twins were 8 months old, 16 months and 5 years.

170  
171

Appetitive traits

172 Child appetite was assessed at 16 months and five years using the child eating behaviour  
173 questionnaire (CEBQ) and the CEBQ-T (toddler version of the CEBQ). The CEBQ is a parent-  
174 reported psychometric measure of eight appetitive traits, which consists of 35 items, rated  
175 using a 5-point Likert scale (1=Never to 5=Always) (Wardle, Guthrie, Sanderson, & Rapoport,  
176 2001). Each of the eight CEBQ scales examines a different aspect of appetitive behaviour.  
177 Satiety Responsiveness (SR) measures a child's sensitivity to internal cues of 'fullness' (5  
178 items e.g. 'My child gets full up easily'). Food Responsiveness measures a child's drive to eat  
179 in response to external food cues (5 items e.g. 'Given the choice, my child would eat most of  
180 the time'). Enjoyment of Food (EF) assesses a child's subjective pleasure from eating (4 items,  
181 e.g. 'My child loves food'). Desire to Drink (DD) measures a child's wanting for beverages (3  
182 items, e.g. 'My child is always asking for a drink'). Emotional Overeating (EOE; 4 items, e.g.  
183 'My child eats more when worried') and Emotional Undereating (EUE; 4 items, e.g. 'My child  
184 eats less when s/he is tired') assess the extent to which a child eats (more or less) in response  
185 to emotional stressors. Slowness in Eating (SE) refers to the speed of meal consumption (4  
186 items, e.g. 'My child eats slowly'). Finally, Food Fussiness (FF) examines a child's pickiness  
187 about the flavour and texture of foods they are willing to eat (6 items, e.g. 'My child refuses  
188 new foods at first'). The CEBQ-T is a slightly modified version of the CEBQ (Wardle et al.,  
189 2001), that has been adapted for toddlers. The majority of CEBQ and the CEBQ-T items are  
190 identical, except for small changes to the wording of items in the EOE and SR subscales of  
191 the CEBQ-T (see appendix 1). Two scales, EUE and DD, were removed from the CEBQ-T as  
192 during the piloting of this questionnaire, mothers reported that their toddlers did not engage in  
193 these behaviors (Herle, Fildes, van Jaarsveld, Rijdsdijk, & Llewellyn, 2016).

194

#### 195 Demographic information

196 Parents reported the sex, date of birth and birth weight (kg) of their twins in the baseline  
197 questionnaires. Mothers consulted their child's health records (completed by health  
198 professionals but held by the mother) when reporting birthweight and any subsequent weight  
199 measurements available at completion of the baseline (8 months) and 16 months

200 questionnaires. Electronic weighing scales and height charts were sent to all families when  
201 the twins were aged two years to collect parent reported anthropometric measurements every  
202 3 months. Height (m) and weight (kg) data at 16 months and 5 years (60 months) (missing  
203 data was replaced with nearest available data  $\pm 3$  months) were used to calculate weight and  
204 BMI standard deviation scores (SDS), adjusted for age, sex and gestational age based on  
205 British 1990 growth reference data (Cole, 1996; Freeman et al., 1995). Paternal and maternal  
206 BMI ( $\text{kg}/\text{m}^2$ ) data were also self-reported at baseline. Missing data for maternal BMI was  
207 replaced with imputed values using the Expectation Maximisation method (Dempster, Laid, &  
208 Rubin, 1997).

209

## 210 SES

211 At baseline, parents provided information about multiple indicators of SES including; highest  
212 maternal educational qualifications, current occupation (both parents), total annual household  
213 income, postcode, home ownership status, number of bedrooms in the home, and number of  
214 cars.

215

216 Occupation was used to calculate each household's National Statistics Socioeconomic Class  
217 (NS-SEC) using the simplified method in which occupation is attributed a four-digit Standard  
218 Occupation Classification 2000 (SOC2000) code, using the Computer Assisted Structured  
219 Coding tool (Cascot). For individuals with two jobs, the highest NS-SEC score was used. The  
220 parent or carer with the highest NS-SEC score was defined as the household reference person  
221 (HRP) and their score was used to represent the household NS-SEC score. NS-SEC scores  
222 were organised in 8 categories: 1 = 'Never worked or long-term unemployed', 2 = 'Routine  
223 occupation', 3 = 'Semi-routine', 4 = 'Lower supervisory/technical occupation', 5 = 'Small  
224 employers and own account workers', 6 = 'Intermediate occupations', 7 = 'Lower managerial  
225 and professional occupations', 8 = 'Large employers and higher managerial and higher  
226 professional occupations'. Further information about the classification of occupations with the  
227 NS-SEC are published elsewhere (Office for National Statistics, 2019). It was possible to

228 attribute an NS-SEC score to 2394 (99.7% of cohort) households. Higher scores represented  
229 a household with higher SES.

230

231 Home ownership status was classified according to the Census 2001 and was used as an  
232 indicator of SES. Families were asked to state their home ownership status based on the  
233 following categories; 1 = 'Own without mortgage', 2 = 'Own with mortgage', 3 = 'Rent privately'  
234 and 4 = 'Rent from local authority'. The numerical codes were reverse scored to ensure higher  
235 scores represented higher SES.

236

237 Postcodes at baseline were used to assign each household with an Index of Multiple  
238 Deprivation (IMD) score. IMD is commonly used to measure the level of deprivation in each  
239 local area in England and Wales. IMD is calculated based on seven different measures of  
240 local deprivation, including Employment, Education, Living Environment, Income, Crime,  
241 Health deprivation, Disability, and Barriers to housing and services. These domains are then  
242 used to attribute a weighted overall IMD score for each local area, with higher IMD scores  
243 representing higher level of deprivation. IMD scores could be assigned to 2,378 households  
244 based on their postcode, and these were subsequently categorised into 5 quintiles of  
245 deprivation (NPEU Tools, 2010). Quintiles were classified as follows: 1 = 'score  $\leq 8.49$  (least  
246 deprived quintile)', 2 = '8.5 -13.79', 3= '13.8 - 21.35', 4 = '21.36 - 34.17', 5= ' $\geq 34.18$  (most  
247 deprived quintile)'. These were then reverse scored so that 1 = 'most deprived' and 5 = 'least  
248 deprived'.

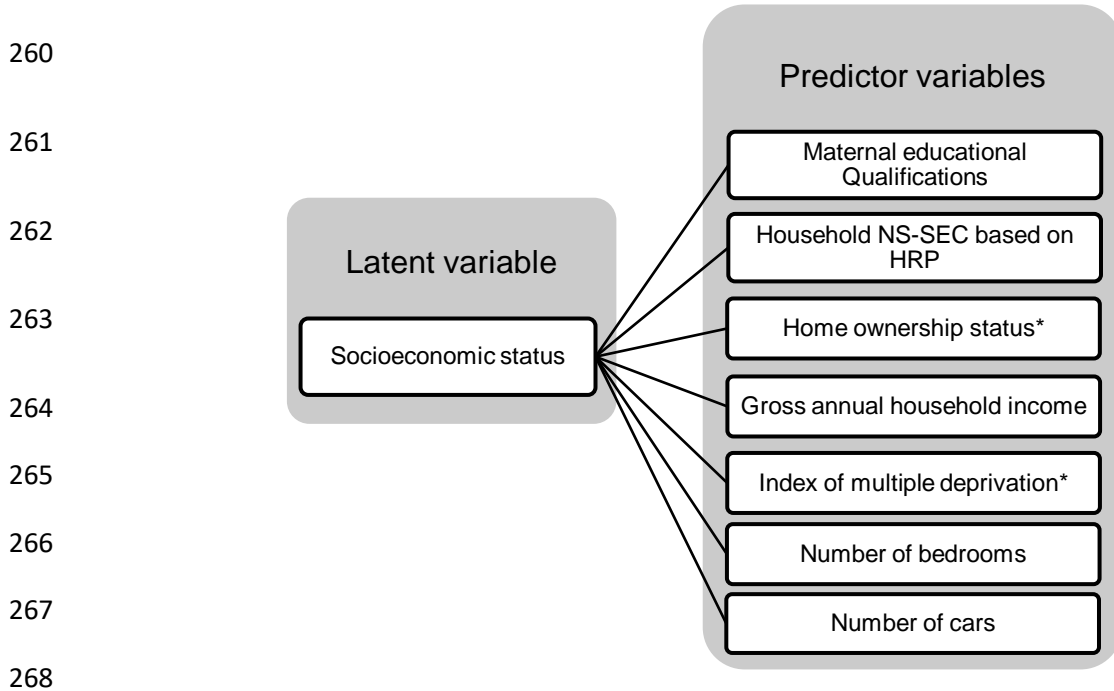
249

250 Annual household income was assessed with the following question 'What is the total  
251 household income (before tax deduction)?'. Responses were categorized into 12 bands,  
252 starting at 1 = '*Up to £15k*', up to 12 = '*More than 90k+*'.

253

254 Mothers were asked to report the highest educational qualification achieved. Response  
255 options ranged from 1 = 'No qualifications' to 7 = 'Postgraduate qualification (e.g. Master's or  
256 PhD)'.  
257

258 These components of social class were then used to create a weighted composite measure  
259 of SES (Figure 2).



269 **Figure 2:** The indicators of socioeconomic status that were included within the composite  
270 measure of SES (\*item reverse scored).

271

## 272 **Statistical analyses**

273 Statistical analyses were conducted using SPSS v25 (IBM Corp, Armonk, NY) . Principal  
274 component analysis (PCA) was conducted on the 7 correlates with direct oblimin to ascertain  
275 the number of latent variables that should be included in the composite measure. The  
276 weighted SES composite scores were generated using principal components analysis (PCA).

277

278 Multiple linear regression models examined cross-sectional associations between SES  
279 (independent variable) and each appetitive trait at 16 months (6 traits) and five years (8 traits)

280 (dependent variables), controlling for sex, birthweight and parental BMI (mean BMI of both  
281 parents). Separate regression models were run for each appetitive trait. Multiple linear  
282 regression models were also used to model associations between SES (independent variable)  
283 and change in each appetite trait from 16 months to five years (dependent variable), controlling  
284 for appetite at 16 months, sex, birthweight and parental BMI (average of maternal and paternal  
285 BMI).

286

287 **Results**

288 Characteristics of the sample are shown in Table 1. Gemini was largely representative of twin  
 289 births in England and Wales in 2007 in terms of the distribution of sex and zygosity (Jaarsveld,  
 290 Johnson, Llewellyn, & Wardle, 2010), and sex and zygosity were similar at 16 months and 5  
 291 years to baseline. At baseline, Gemini mothers were slightly older than the national average;  
 292 33.6y compared to 29.5y nationally (Jaarsveld et al., 2010).

293

294 **Table 1:** Characteristics of the Gemini study sample (n = 2402 twins<sup>1</sup>)

Characteristics	Mean ( $\pm$ SD) or N (%)
Sex [n (%)]	
Male	1194 (49.7)
Female	1208 (50.3)
Zygosity [n (%)]	
Monozygotic	749 (31.2)
Dizygotic	1616 (67.3)
Unknown	37 (1.5)
Weight SDS at birth (n = 2318)	-0.52 $\pm$ 1.11
Weight SDS at 16 months (n = 1584)	-0.09 $\pm$ 1.12
BMI SDS at age 5 (n = 929)	-0.04 $\pm$ 0.95
Maternal age (in years) at twins' birth (n = 2396)	33.6 $\pm$ 5.2
Maternal BMI at baseline (n = 2338)	25.10 $\pm$ 4.76
Maternal BMI at baseline	
Desirable weight	1361 (56.7)
Overweight	723 (30.1)
Obese	317 (13.2)
Parents BMI at baseline (n = 2401)	25.75 $\pm$ 3.3
Parents BMI at baseline	
Healthy weight	1108 (46.1)
Overweight	1039 (43.3)
Obese	254 (10.6)
Ethnicity	
White British	2089 (87.0)
Non-White	311 (12.9)
Not Known	2 (0.1)
NS-SEC classification <sup>2</sup>	
High	1515 (63.1)
Middle	407 (16.9)
Low	472 (19.7)
Not Known	8 (0.3)

<sup>1</sup>Only one twin per household is presented in this table. Zygosity was unknown for 37 pairs, due to inconsistent questionnaire results and no DNA available.

<sup>2</sup>Classified based on the Office for National Statistics Socioeconomic Classification (NS-SEC) and grouped into high (higher and lower managerial and professional occupations), middle (intermediate occupations, small employers and own account workers) and low (lower supervisory and technical occupations, (semi)routinely occupations, never worked and long-term unemployed). In comparison to the average statistics for the UK population, Gemini has a higher percentage of high SES families, (63.1% vs 49%) and less low SES families (19.7% vs 33%). Figures on National Statistics from Health Survey for England 2007 (Health and Social care Information Centre, 2008).

295

296 Developing the SES composite measure

297 Correlations between each of the individual indicators of social class ranged from  $r=0.16$   
298 (maternal education and number of cars) and  $r=0.57$  (NS-SEC and gross annual income) but  
299 tended to be low to moderate in size indicating that each measure is tapping into a separate  
300 component of SES (**Error! Reference source not found.**). The Kaiser-Meyer-Olkin (KMO)  
301 revealed that the sample was adequate to run the PCA (KMO = .82). PCA revealed all seven  
302 SES indicators loaded well onto a single factor (all had factor loadings  $>0.4$ ) and all were  
303 therefore included in the final composite measure. Household annual income (0.77) and  
304 household NS-SEC (0.75) loaded highest and were given the highest weightings in the  
305 composite measure. These were followed by maternal education (0.56), home ownership  
306 status (0.54), IMD score (0.49), number of bedrooms (0.46) and number of cars (0.43).  
307 Weightings were attributed to individual components of the composite based on their factor  
308 loadings. These weighting were combined with the raw values and used to calculate the  
309 weighted SES composite using the following equation: SES composite = (household annual  
310 income\*.22) + (household NS-SEC \* .22) + (maternal education\*.18) + (home ownership  
311 status\*.18) + (IMD score\*.08) + (number of bedrooms\*.06) + (number of cars\*.06). Internal  
312 reliability for the composite measure was high (Cronbach  $\alpha = .72$ ) and was not improved by  
313 removing any individual indicator.

314

315 Full details of the associations between CEBQ measured appetitive traits and the individual  
316 and composite SES measures are shown in Supplemental table 1.

317

### 318 **Cross-sectional associations between SES and appetite**

319 Table 2 shows the results from the cross-sectional multiple linear regression models, which  
320 explored associations between the composite measure of SES and each of the CEBQ  
321 appetitive traits at 16 months and five years, while controlling for child sex, birth weight and  
322 parental BMI. At 16 months, lower SES was significantly associated with higher Food



323 Responsiveness (standardised  $\beta = -.09 \pm .02$ ,  $p = 0.001$ ), higher Enjoyment of Food  
324 (standardised  $\beta = -.13 \pm .02$ ,  $p > 0.001$ ), lower Satiety Responsiveness (standardised  $\beta = .09$   
325  $\pm .02$ ,  $p = 0.001$ ) and lower Food Fussiness (standardised  $\beta = .09$ ,  $\pm .02$   $p > 0.001$ ), but the  
326 effect sizes were small. Overall, the  $\Delta R^2$  revealed that the model including the SES composite  
327 explained between 0.6-1.6% of the variance in appetitive traits at 16 months.

328

329 At five years, lower SES was associated with higher Desire to Drink (standardised  $\beta = -.22 \pm$   
330  $.03$ ,  $p < 0.001$ ), higher Food Responsiveness (standardised  $\beta = -.10 \pm .03$ ,  $p = 0.002$ ), and  
331 higher Emotional Overeating (standardised  $\beta = -.10 \pm .03$ ,  $p = 0.002$ ) but was no longer  
332 associated with Enjoyment of Food, Satiety Responsiveness or Food Fussiness. Effect sizes  
333 were small. Overall, the  $\Delta R^2$  revealed that the model including the SES composite explained  
334 between 0.9-4.5% of the variance in appetitive traits at 5 years.

335

336 **Table 2.** Linear regression examining cross-sectional associations between appetitive traits  
 337 and SES at 16 months (n = 1784<sup>a</sup>) and 5 years (n = 976<sup>b</sup>) – adjusted models<sup>1</sup>.

Appetitive traits at 16 months	SES composite					
	Mean	(SD)	Standardised $\beta \pm$ SE	p	Adjusted R <sup>2</sup>	$\Delta R^2$
FR	2.28	(0.76)	-.09 ± .02	<0.001**	.013	.006
EF	4.18	(0.62)	-.13 ± .02	<0.001**	.007	.016
EOE	1.64	(0.59)	-.01 ± .02	0.85	.003	.002
SR	2.68	(0.62)	.09 ± .02	<0.001**	.019	.006
SE	2.49	(0.65)	.05 ± .02	0.03	.022	.002
FF	2.19	(0.71)	.09 ± .02	<0.001**	-.002	.006
Appetitive traits at 5 years						
FR	2.37	(0.75)	-.10 ± .03	0.002*	.015	.009
EF	3.89	(0.68)	-.02 ± .03	0.47	.006	.00
EOE <sup>b</sup>	1.56	(0.50)	-.10 ± .03	0.002*	.008	.01
SR	2.84	(0.62)	.03 ± .03	0.42	.033	.033
SE	2.90	(0.77)	-.01 ± .03	0.79	.025	.024
FF	2.75	(0.83)	.00 ± .03	0.92	.001	.000
EUE <sup>b</sup>	2.66	(0.84)	-.01 ± .03	0.88	-.003	-.004
DD	2.43	(0.89)	-.22 ± .03	<0.001**	.028	.045

Note. <sup>1</sup>Adjusted for sex, birth weight, and parental BMI. \* p < 0.01; \*\*p < 0.001

<sup>a</sup> N for each appetitive trait at 16 months (FR n = 1784; EF n = 1784; FF n = 1787; SR n = 1788; SE n = 1785; EOE n = 1784)

<sup>b</sup> N for each appetitive trait at 5 years (EF n = 974; FR n = 978; SE n = 978; EUE n = 967; EOE n = 966)

Adjusted R<sup>2</sup> variance explained by the model including only the covariates (sex, birth weight, parental BMI).  $\Delta R^2$  variance explained by model including covariates (sex, birth weight, parental BMI) and SES composite.

**Abbreviations:** FR=Food Responsiveness; EF=Enjoyment of Food; FF=Food Fussiness; EOE=Emotional overeating; SE=Slowness in Eating; SR=Satiety responsiveness; EUE=Emotional undereating; DD=Desire to drink

338

339 **Prospective associations between SES and appetite**

340 Prospectively, lower SES predicted greater increases in two appetitive traits that characterise  
 341 greater appetite avidity from 16 months to 5 years; EOE (standardised  $\beta$  = -.10 ± .032) and  
 342 FR (standardised  $\beta$  = -.09, ± .030; both p < 0.01) (see **Table 3**). The effect sizes were small.  
 343 Overall, the  $\Delta R^2$  revealed that the model including the SES composite explained 0.7-1% of the  
 344 variance in appetitive traits.

345

346 **Table 3.** Linear regression model examining longitudinal associations between SES and  
 347 change in appetite from 16 months to 5 years (n = 941<sup>a</sup>).

Appetitive traits at 5 years	SES composite <sup>1</sup>				Adjusted R <sup>2</sup>	$\Delta R^2$
	Standardised $\beta \pm$ SE	t	p			
FR	-.09 ± .03	-3.08	.002*	.005	.007	
EF	.42 ± .03	1.36	.18	.001	.001	
EOE	-.10 ± .03	-3.18	.002*	.006	.010	
SR	-.01 ± .03	-.26	.80	.013	.000	

<b>SE</b>	-0.01 ± 0.03	-0.36	.72	.013	.000
<b>FF</b>	-0.03 ± 0.03	-1.08	.28	.000	.000

Note. <sup>a</sup>N for each appetitive trait (EF n = 938; EOE n = 929; FR n = 940; SR n = 941; SE n = 941; FF n = 941).

<sup>1</sup>Adjusted for appetite at 16 months, sex, birth weight and parental BMI. \* p < 0.01; \*\*p < 0.001.

Adjusted R<sup>2</sup> variance explained by the model that includes covariates (sex, birth weight, and parental BMI). ΔR<sup>2</sup> variance explained by model including covariates (sex, birth weight, parental BMI) and SES composite.

**Abbreviations:** FR=Food Responsiveness; EF=Enjoyment of Food; FF=Food Fussiness; EOE=Emotional overeating; SE=Slowness in Eating; SR=Satiety responsiveness; EUE=Emotional undereating; DD=Desire to drink

349 **Discussion**

350 To our knowledge, this is the first study to explore the cross-sectional and prospective  
351 associations between SES and appetite in early childhood. Our findings indicated that children  
352 from lower SES households exhibited appetitive traits that characterise a more avid appetite,  
353 with higher food responsiveness, higher enjoyment of food, lower food fussiness and lower  
354 satiety responsiveness at 16 months compared to high SES households. The cross-sectional  
355 association between lower SES and higher food cue responsiveness remained at five years.  
356 Additionally, at 5 years lower SES was associated with higher emotional overeating and higher  
357 desire to drink. Prospectively, being from a lower SES predicted greater increases in two key  
358 weight-related appetitive traits that characterise a more avid appetite - food responsiveness  
359 and emotional overeating - from toddlerhood (16 months) into early childhood (5 years).

360

361 Individual differences in appetite emerge in early infancy, and while appetitive traits are shown  
362 to be relatively stable over time (Ashcroft, Semmler, Carnell, van Jaarsveld, & Wardle, 2007;  
363 Farrow & Blissett, 2012), children tend to become more appetitive as they approach  
364 adolescence. Gradual increases in food responsiveness, enjoyment of food and emotional  
365 overeating and decreases in satiety responsiveness and food fussiness have been reported  
366 between the ages of 4 and 11 (Ashcroft et al., 2007; Farrow & Blissett, 2012). In this study  
367 lower SES predicted greater increases in food responsiveness during childhood, suggesting  
368 children from more disadvantaged backgrounds are more susceptible to increases in food  
369 responsiveness compared to children of higher SES. Twin studies highlight that food  
370 responsiveness is highly heritable (Llewellyn & Fildes, 2017; Llewellyn et al., 2010), yet the  
371 behavioural expression of higher food cue responsiveness is only possible when the  
372 environment permits it (Wardle & Carnell, 2009). A child of lower SES is more likely to live in  
373 a higher risk 'obesogenic' environment, with greater exposure to unhealthy foods, less  
374 mealtime structure, less responsive feeding practices (e.g. parental use of food as reward,  
375 emotional feeding, and pressuring to eat) (Gross, Mendelsohn, Fierman, Racine, & Messito,  
376 2012; Rodgers et al., 2013) and therefore greater exposure to environmental cues to eat

377 (Baumann, Szabo, & Johnston, 2017; Rodgers et al., 2013; Rudy et al., 2016). These  
378 environmental factors may help to explain the observed socioeconomic differences in appetite  
379 (Caldwell & Sayer, 2019), as well as increases in appetite avidity over the preschool years, as  
380 children gain autonomy and are increasingly able to interact with their environments.

381

382 Lower SES also predicted greater increases in emotional overeating, from toddlerhood (16  
383 months) to early childhood (5 years). Unlike most other appetitive traits which have strong  
384 genetic underpinnings, individual variation in emotional overeating in childhood is largely  
385 explained by environmental influences (Herle, Fildes, Rijdsdijk, Steinsbekk, & Llewellyn, 2018).

386 The home environment may be more chaotic or stressful in deprived households, potentially  
387 due to greater financial instability, greater parental stress, food insecurity or less structure  
388 within the household, which may in turn increase the likelihood of a child using food as a  
389 mechanism to cope with higher levels of emotional distress (Boswell et al., 2018). Indicators  
390 of SES, such as income or maternal education, have also been associated with parental  
391 feeding styles or practices linked to the development of child overweight. It has been reported  
392 that parents of lower SES may be less likely to model healthy eating behaviours, be less  
393 responsive to child's cues of hunger and satiety in their feeding styles and may be more likely  
394 to use food as reward or to comfort compared to higher SES parents (Bauer, Hearst, Escoto,  
395 Berge, & Neumark-Sztainer, 2012; Braden et al., 2014; Cardel et al., 2012; Pinket et al., 2016;  
396 Rodgers et al., 2013). Parental feeding strategies such as using food as a reward to control  
397 behaviour (so-called 'instrumental feeding') and using food to soothe an upset or distressed  
398 child (so-called 'emotional feeding') have both been positively associated with emotional  
399 overeating (Jansen, Mallan, Nicholson, & Daniels, 2014; Steinsbekk et al., 2018). It is possible  
400 that parents of low SES are more likely to use food to pacify their children's emotional states,  
401 and that it is this parental behaviour that teaches a child to use food to cope with emotional  
402 distress (Demir & Bektas, 2017; Rodgers et al., 2013).

403

404 Findings also revealed children of lower SES were less satiety sensitive at 16 months. The  
405 extent to which parents adopt responsive feeding practices during milk feeding and weaning  
406 have been linked with an infant's ability to regulate their own appetite and may reduce risk of  
407 obesity (Brown & Lee, 2012; Brown & Lee, 2015; Carnell, Benson, Driggin, & Kolbe, 2014;  
408 DiSantis, Collins, Fisher, & Davey, 2011; Llewellyn et al., 2010; Paul et al., 2018). Differences  
409 in parental feeding practices have been observed across SES groups, with lower SES mothers  
410 less likely to be responsive to child's cues of hunger and satiety, and more likely to use  
411 strategies such as emotional feeding, restriction or pressuring to eat (Dubois & Girard, 2003;  
412 Gibbs & Forste, 2014; Gross et al., 2012). Such parental feeding styles may mediate the  
413 relationship between SES and satiety responsiveness observed in this study. However, as  
414 this relationship had disappeared by 5 years, these findings suggest no enduring link between  
415 SES and satiety responsiveness beyond the very early years.

416

417 In the present study, being of lower SES was associated with lower Food Fussiness at 16  
418 months. These findings contradict previous research suggesting fussy eating behaviours are  
419 more common in children from lower income households (Cardona Cano et al., 2015; Gibson  
420 & Cooke, 2017; Tharner et al., 2014). Fussy eating commonly emerges during early infancy  
421 and is characterised by rejection of novel foods (neophobia) and general pickiness around the  
422 flavours and textures a child is willing to eat (Dovey, Staples, Gibson, & Halford, 2008).  
423 Research has shown that repeated exposure to a specific food increases acceptance (Fildes,  
424 van Jaarsveld, Wardle, & Cooke, 2014; Gibson & Cooke, 2017; Turrell, 1998) and exposure  
425 to a wide variety of foods in infancy has been linked with greater dietary variety and reduced  
426 neophobia in childhood (Mallan, Fildes, Magarey, & Daniels, 2016). Children from more  
427 deprived backgrounds tend to be offered fewer fruits and vegetables (Trude et al., 2016),  
428 potentially reducing their opportunities for exposure and leading to narrower food preferences  
429 compared to children from more affluent households (Turrell, 1998). In this context, the finding  
430 of reduced food fussiness in children from lower SES backgrounds might seem counter-  
431 intuitive. However, qualitative research reveals lower income families are less likely to provide

432 children with opportunities to try new foods, instead offering familiar and well-liked foods to  
433 avoid potential food waste (Daniel, 2016). This means opportunities for the behavioural  
434 expression of fussy eating may be reduced in lower SES households, likely causing parents  
435 to perceive and report lower levels of food fussiness in their children. In contrast, higher  
436 income families may offer a broader range of foods, particularly commonly rejected foods such  
437 as vegetables, and introduce novel foods more frequently, thereby providing ample  
438 opportunity for a child to express their fussy eating tendencies (Daniel, 2016). Again, SES  
439 differences in fussy eating were no longer present by the time the children were five years.  
440 This may be due to general increases in exposure to novel or disliked foods for all children,  
441 regardless of SES, as they gain autonomy and experience a broader range of foods both  
442 inside and outside the home.

443

444 Children from lower SES families exhibited higher desire to drink at age five; in line with  
445 previous research in low income families (Lora, Hubbs-Tait, Ferris, & Wakefield, 2016). Higher  
446 desire to drink has been associated with greater preference for, and increased consumption  
447 of, sugar sweetened beverages (SSB) and fruit juices (Sweetman, Wardle, & Cooke, 2008).  
448 Research suggests a socioeconomic gradient to SSB consumption, with individuals of lower  
449 SES consuming more of these types of drinks (Bolt-Evensen, Vik, Stea, Klepp, & Bere, 2018;  
450 De Coen et al., 2012; Hupkens, Knibbe, van Otterloo, & Drop, 1998).

451

## 452 **Strengths and limitations**

453 Strengths of this study include the large sample size, prospective analyses and the use of a  
454 composite measure of SES, which incorporates multiple indicators of socioeconomic position.  
455 These results are in line with previous studies which have highlighted the importance of using  
456 multiple correlates to measure SES (Marra, Lynd, Harvard, & Grubisic, 2011; Shrewsbury &  
457 Wardle, 2008). However, there are several limitations. Firstly, appetite was parent-reported,  
458 which may introduce measurement error due to the subjective nature of the assessment.  
459 However, the CEBQ has been shown to be valid reliable measure in diverse populations, with

460 good correspondence to objective measures (Ashcroft et al., 2007; S. Carnell & Wardle, 2007;  
461 Domoff, Miller, Kaciroti, & Lumeng, 2015). Nevertheless, social desirability bias cannot be  
462 ruled out and may be particularly problematic if the level of bias varied by SES. Secondly,  
463 weights and heights for the twins' were also parent-reported, however previous research has  
464 shown high correspondence between parent- and researcher-measured heights and weights  
465 (Wardle, Carnell, Haworth, & Plomin, 2008). Thirdly, although our analyses adjusted for  
466 confounding variables, it is possible that residual confounding by other factors could remain.  
467 A fourth limitation is the use of the twin sample, as twins typically have lower birth weights  
468 compared to singletons (Estourgie-van Burk, Bartels, van Beijsterveldt, Delemarre-van de  
469 Waal, & Boomsma, 2006), meaning this sample may not fully represent the general population  
470 or variation across SES groups. However, there is no reason to believe the association  
471 between SES and appetite would be different for twins versus singletons. Finally, as is  
472 common with cohort studies the sample has a higher percentage of higher SES families  
473 (63.1% vs 49%) and fewer low SES families mid-high SES (19.7% vs 33%; Health and Social  
474 care Information Centre, 2008) thus, the true impact of SES on appetite may not have been  
475 fully captured in this population, which may be reflected in the modest  $\Delta R^2$  (0.9-4.5%)  
476 attributable to SES. Future analyses should be conducted in samples with greater variation in  
477 SES to see if relationships between SES and appetite are stronger in more diverse  
478 populations. Although the PCA analyses showed the SES composite was appropriate in this  
479 sample, an important next step is to ascertain whether the composite measure is stable in  
480 another cohort.

481

## 482 **Conclusion**

483 In summary, children growing up in lower SES households had greater increases in two key  
484 appetitive traits, food responsiveness and emotional overeating, from toddlerhood (16 months)  
485 to early childhood (age 5). These appetitive traits have been consistently positively associated  
486 with weight in childhood, which suggests that appetite may be a behavioural mediator of the



487 well-established link between childhood deprivation and obesity risk. Further research is  
488 needed to understand how differences in SES relate to the behavioural expression of appetite  
489 avidity and how these differences in appetite may contribute towards excess weight gain in  
490 childhood.

491

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499

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## Appendix 1: Child Eating Behaviour Questionnaire-Toddler (CEBQ-T) item modifications

Appetitive traits	Child Eating Behaviour Questionnaire (CEBQ)	Child Eating Behaviour Questionnaire – Toddler Version
Emotional overeating	<ol style="list-style-type: none"> <li>1. My child eats more when worried</li> <li>2. My child eats more when annoyed</li> <li>3. My child eats more when anxious</li> </ol>	<ol style="list-style-type: none"> <li>1. My child eats more when irritable</li> <li>2. My child eats more when grumpy</li> <li>3. My child eats more when upset</li> </ol>
Satiety responsiveness	<ol style="list-style-type: none"> <li>1. My child leaves food on his/her plate at the end of a meal</li> </ol>	<ol style="list-style-type: none"> <li>1. My child leaves food on his/her plate or in the jar at the end of a meal</li> </ol>

**Supplemental table 1.** Demographic information for the multiple indicators of SES used within the composite measure of SES.

<b>Indicator of SES</b>	<b>N</b>	<b>%</b>
<b>Maternal Education qualification</b>		
No qualifications	129	5.4
GCSE, CSE, O level	389	16.2
Vocational qual	374	15.6
A or AS level	258	10.7
HNC or HND	246	10.2
Undergrad	619	25.8
Postgrad	387	16.1
<b>NS-SEC based on the HRP<sup>1</sup></b>		
Unemployed or never worked	15	.6
Routine occupation	13	.5
Semi-routine	358	15.0
Lower supervisory	86	3.6
Small employer and own account worker	122	5.1
Intermediate occupations	285	11.9
Lower managerial and professional occupations	743	31.0
Large employers and higher managerial and higher professional occupation	772	32.2
<b>Number of bedrooms in household</b>		
1	35	1.5
2	401	16.7
3	1154	48.1
4	585	24.4
5	166	6.9
6+	59	2.4
<b>Number of cars per household</b>		
0	144	6.0
1	814	33.9
2	1335	55.6
3	82	3.4
4	18	.8
5	4	.2
6	2	.1
<b>Home ownership status</b>		
Rent from local authority	189	8.0
Rent privately	275	11.6
Own with mortgage	1745	73.5
Own without mortgage	165	7.0
<b>Index of multiple deprivation (quintiles)</b>		
1 – most deprived	304	12.8
2	412	17.3
3	476	20.0
4	573	24.1
5 – least deprived	613	25.8
<b>Annual household income (before tax deduction) (n = 2314)</b>		
Up to £15k	202	8.7
£15-22.5k	257	11.1
£22.5-30k	320	13.8
£30-37.5k	285	12.3
£37.5-45k	254	11.0
£45-52.5k	223	9.6
£52.5-60k	178	7.7
£60-67.5k	122	5.3
£67.5-75k	104	4.5
£75-82.5k	71	3.1
£82.5-90k	46	1.9
More than 90k <sup>1</sup>	252	10.5

Note. SES = Socioeconomic status, HRP = Household reference person, NS-SEC = National Statistics Socioeconomic Class (NS-SEC). <sup>1</sup>The NS-SEC score for each household was classified based on the Household reference person (i.e. the person within the household that has the highest NS-SEC score). Further details published elsewhere (ONS, 2019).

<sup>1</sup> The annual household income upper limit is 100k.



**Supplemental table 2:** Pearson's Correlation Co-efficient correlations between individual SES indicators and composite measure of SES (baseline) and Child Eating Behaviour Questionnaire appetitive traits at 16 months and 5 years.

		Socioeconomic factor						Appetite at 16 months						Appetite at 5 years								
		IMD	Income	Tenure	NS-SEC	No. of bedroom	No. cars	Maternal Education	SR	FR	EF	EOE	FF	SE	SR	FR	EF	EOE	DD	FF	SE	EUE
Socioeconomic factors	SES composite	<b>.481**</b>	<b>.897**</b>	<b>.522**</b>	<b>.802**</b>	<b>.435**</b>	<b>.375**</b>	<b>.683**</b>	<b>.075**</b>	<b>-.079**</b>	<b>-.126**</b>	-.005	<b>-.086**</b>	.032	.005	<b>-.102**</b>	-.017	<b>-.093**</b>	<b>-.237**</b>	.010	-.022	-.006
	IMD quintile	1.00	<b>.361**</b>	<b>.228**</b>	<b>.357**</b>	<b>.257**</b>	<b>.279**</b>	<b>.243**</b>	-.033	-.013	-.020	.035	.011	<b>-.054</b>	<b>-.076*</b>	.021	<b>.066*</b>	-.035	<b>-.085**</b>	-.026	-.034	-.026
	Gross annual income	-	1.00	<b>.358**</b>	<b>.572**</b>	<b>.411**</b>	<b>.273**</b>	<b>.441**</b>	<b>.057*</b>	<b>-.066*</b>	<b>-.10**</b>	.002	<b>.061*</b>	.029	.010	-.136	-.046	<b>-.105**</b>	<b>-.187**</b>	.013	-.025	-.022
	Household tenure	-	-	1.00	<b>.439**</b>	<b>.276**</b>	<b>.341**</b>	<b>.299**</b>	<b>.070*</b>	<b>-.075**</b>	<b>-.070**</b>	-.011	.047	.041	<b>.066*</b>	-.121	-.009	-.070*	<b>-.155**</b>	.006	.045	.017
	NS-SEC based on HRP	-	-	-	1.00	<b>.237**</b>	<b>.288**</b>	<b>.482**</b>	<b>.061*</b>	-.056*	<b>-.081**</b>	-.010	<b>.070**</b>	.033	.022	<b>-.082**</b>	-.014	-.063*	<b>-.167**</b>	-.036	.022	.017
	Number of bedrooms	-	-	-	-	1.00	<b>.344**</b>	<b>.177**</b>	-.001	-.035	-.043	.000	.010	-.006	-.013	<b>-.091**</b>	-.041	-.046	-.057	.023	-.030	-.016
	Number of cars	-	-	-	-	-	1.00	<b>.156**</b>	-.023	.004	-.004	-.026	.004	-.007	-.024	-.020	.015	-.043	-.03	-.004	-.032	-.018
	Maternal education	-	-	-	-	-	-	1.00	<b>.099**</b>	<b>-.068**</b>	<b>-.146**</b>	-.023	<b>.082**</b>	.044	-.009	-.020	.013	-.034	-.248	.017	-.036	.009
Appetite at 16 months	SR	-	-	-	-	-	-	1.00	<b>-.417*</b>	<b>-.606**</b>	<b>-.069**</b>	<b>.443**</b>	<b>.59**</b>	<b>.40**</b>	<b>-.214**</b>	<b>-.278**</b>	-.027	-.014	<b>.126**</b>	<b>.228**</b>	<b>.109**</b>	
	FR	-	-	-	-	-	-	-	1.00	<b>.370**</b>	<b>.369**</b>	<b>-.177**</b>	<b>-.27**</b>	<b>-.23**</b>	<b>.43**</b>	<b>.19**</b>	<b>.25**</b>	<b>.12**</b>	-.04	<b>-.14**</b>	.047	
	EF	-	-	-	-	-	-	-	-	1.00	<b>.071**</b>	<b>-.604**</b>	<b>-.46**</b>	<b>-.29**</b>	<b>.17**</b>	<b>.41**</b>	.020	.027	<b>-.25**</b>	<b>-.21**</b>	<b>-.06*</b>	
	EOE	-	-	-	-	-	-	-	-	-	1.00	.012	-.044	<b>-.10**</b>	<b>.20**</b>	<b>.08*</b>	<b>.29**</b>	<b>.07*</b>	-.04	<b>-.07*</b>	<b>.08**</b>	
	FF	-	-	-	-	-	-	-	-	-	-	1.00	<b>.34**</b>	<b>.18**</b>	.003	<b>-.28**</b>	<b>.11**</b>	.01	<b>.41**</b>	<b>.18**</b>	<b>.15**</b>	
	SE	-	-	-	-	-	-	-	-	-	-	-	1.00	<b>.26**</b>	<b>-.12**</b>	<b>-.22**</b>	-.004	.040	<b>.11**</b>	<b>.28**</b>	.055	
	SR	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-.318	-.551	-.008	.045	<b>.40**</b>	<b>.56**</b>	<b>.28**</b>	
	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	<b>.38**</b>	<b>.46**</b>	<b>.29**</b>	<b>-.10**</b>	<b>-.23**</b>	<b>.12**</b>	
Appetite 5 years	EF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	.061	.026	<b>-.54**</b>	<b>-.43**</b>	<b>-.12**</b>	
	EOE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	<b>.22**</b>	<b>.072*</b>	.026	<b>.42**</b>	
	DD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	.040	.008	<b>.15**</b>	
	FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	<b>.268**</b>	<b>.199**</b>	
	SE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	<b>.26**</b>	
	EUE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00

Note. SR = Satiety Responsiveness; FR = Food Responsiveness; EF = Enjoyment of Food; EOE = Emotional Overeating; FF = Food Fussiness; SE = Slowness in Eating. FF = Food Fussiness; EUE = Emotional Undereating; DD = Desire to Drink. \*p < .01, \*\*p < .001