Prevalence and predictors of weapon carrying and use and other offences at age 17

Evidence from the UK Millennium Cohort Study

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Contents

1 Introduction 4

2 Summary of findings 6

Carrying or using a weapon at age 17 6

Change in prevalence of offending between age 14 and 17 7

Prolific offending at age 17 7

3 The Millennium Cohort Study 9

4 Methods 11

4.1 The sample 11

4.2 Offending behaviours 11

4.3 Predictors of offending 12

4.4 Analysis 14

5 Carrying or using a weapon at age 17 17

5.1 Carrying or using a weapon at age 17 in relation to other offences at age 17 17

5.2 Prevalence of carrying or using a weapon at age 17 in relation to other factors ... 18

5.3 Multivariate prediction of weapon carrying or use at age 17 30

6 Change in prevalence of offending between age 14 and 17 39

6.1 Prevalence of offending at age 14 and 17 39

6.2 Examination of change in offending between age 14 and 17 42

7 Prolific offending at age 17 48

7.1 Concentration of offending 48

7.2 Prolific offending across various offences 50

7.3 Multivariate prediction of prolific offending at age 17 51

8 Discussion and Conclusion 55

Summary of findings 55

Discussion of findings 56

Conclusion 63

9 Appendices 65

Appendix A: Measurement of offending behaviours 65

Appendix B: Measurement of predictor variables 67

Appendix C: Missing data and multiple imputation approach of the study 77

Appendix D: Prevalence of other offences at age 17 by various factors 83

Appendix E: Prediction models for other offences at age 17 96

10 References 108

1 Introduction

Adolescence is a developmental stage characterised by biological and environmental changes that influence risk taking behaviours, including increased involvement in criminal and antisocial activities.[1] The age distribution in offending behaviour is well-established; rates are low in childhood, increase dramatically from early adolescence with a peak in late adolescence, followed by a steep decline in the very late teens and early 20s, and a more steady decline through adulthood.[2 3] Explanations for the surge in risk taking behaviours in adolescence include neurobiological, psychological, and social contextual factors. In terms of neurobiology, the brain undergoes significant development in adolescence, with changes in relation to the socio-emotional system, specifically in relation to reward-seeking fuelled by the brain's dopaminergic system, and especially so in the presence of peers.[4 5] Psychologically, adolescents have not yet attained adult cognitive function in self-regulation, and are therefore not fully able to inhibit inappropriate behavioural or emotional responses.[3 6 7] As for social contexts, adolescence is a time when individuals become more independent and spend increasing time with peers who become a significance source of influence.[8 9] A multiple range of additional factors influence adolescent offending, including individual factors such as being male, familial factors, including family socioeconomic and family psychosocial risks, and other environmental influences such as peers and schools.[10]

Despite a higher prevalence of offending behaviour being somewhat normative in adolescence, with the tendency for behaviours to be mostly adolescence limited,[11] these behaviours are nonetheless a concern as they pose a risk of onward development of criminal behaviour.[12] Another major concern around adolescent offending is the harm caused to others, particularly in relation to serious and violent crimes.

In terms of developing effective policies for the prevention of adolescent offending, it is imperative to understand the early underlying factors and mechanisms driving these behaviours, especially early factors prior to offending behaviours, which may provide opportunities for early intervention to prevent criminality.[13] Using rich and nationally representative longitudinal data from the UK Millennium Cohort Study

about young people, their families, and wider social contexts, the current report aims to provide an understanding of the antecedents and development of offending behaviours. The focus is on self-reported offending when cohort members were age 17, with information on influential factors drawn from throughout childhood. Previous analyses were carried out on this sample examining and identifying indicators of carrying or using a weapon at age 14.[14] The current work is a follow-up to this by providing evidence in relation to offending at age 17. As key predictor variables in the present study are measured before the outcome at age 17, it provides a design that better lends itself to causal inference compared to the previous age 14 analyses. The emphasis in this report is on carrying or using a weapon at age 17 but other types of offences are additionally examined.

The aims are as follows:

1. To examine a wide range of factors associated with carrying or using a weapon at age 17 (bivariate associations) and to further identify predictors of this outcome using multivariate regression.
2. To estimate the prevalence of various offending behaviours at ages 14 and 17 and to examine predictors related to change between these age points.
3. To establish the concentration of offending and to examine prevalence and predictors of prolific offending at age 17.

2 Summary of findings

Carrying or using a weapon at age 17

- At age 17, 6.4% of young people self-reported carrying or using a weapon in the past year. For males the figure was 8.8% and for females 3.9%.
- Carrying or using a weapon at age 17 intersected with other types of offences at the same age. Of those who had carried or used a weapon in the past year, 66% reported assault, 32% had shoplifted, 20% committed neighbourhood crime, 50% were involved in criminal damage, 30% reported cybercrime, and 5.3% had participated in online bullying. A high proportion (26%) of those who had carried or used a weapon were currently or previously member of a gang.
- Weapon carrying or use at age 17 was associated with a wide range of prior factors, when examined bivariately with no other variables controlled for. Factors related to a higher prevalence of carrying or using a weapon included individual characteristics, socioeconomic background, family environment, school factors, child and adolescent mental health, leisure activities, peer factors, substance use, and previous involvement in offending behaviours.
- In multivariate examinations of weapon carrying or use at age 17, controlling for other variables, many bivariate associations dissipated. Significant associations remained for being male, use of substances at age 14, spending a lot of time on computer/electronic gaming at age 14, being excluded from school between age 11 and 14, and having peers who use multiple substance at age 14. Furthermore, these age 14 experiences and behaviours appeared to be mediators between childhood experiences (low household income, domestic abuse between parents, externalising problems, and self-harm in adolescence) and carrying or using a weapon at age 17. Finally, cohort members carrying or use of a weapon previously at age 14 was highly predictive of continuity at age 17. There were no differences between males and females in terms of variables associated with this age 17 outcome.

Change in prevalence of offending between age 14 and 17

- In terms of the change in cohort members engagement in a range of offending behaviours between age 14 and 17, there was an increase in participation for most offences. This increase was seen for carrying a weapon, used of weapon, shoplifting, theft from person, graffiti, and vandalism. There was no change for breaking and entering property, or for computer hacking, or sending of virus/malware/spyware. Only assault had decreased between the two age points.
- Generally persistent offending (engagement at both ages) within the same type of offence was rare, although for assault it was slightly more common. Factors associated with persistent offending across all types of offences were: being male, age 14 self-harm, substance use, truancy, and peer substance use. Many factors that were associated with persistent offending were also related to offending limited to age 14.

Prolific offending at age 17

- Offending tended to be concentrated, meaning that a very small group of offenders were responsible for most offences. Overall, 87% of offences were committed by a little less than 5% of cohort members.
- In terms of frequency of offending in the past year, 84% had never engaged in any activities, 6.4% reported offending on 1-2 occasions, 3.9% reported participation 3-9 times, and 5.6% had engaged 10 or more times and were classified as prolific offenders.
- Those who had carried or used a weapon were much more likely to be a prolific offender, with 35.6% reporting offending 10 or more times in the past year, compared to only 3.5% of those who had not caried or used a weapon.
- Some factors that distinguished prolific offenders from those who had never engaged in any offences were: being male and having reported engagement in many different types of offending activities as age 14 were both risk factors, whilst there was indication that some ethnic minorities had a lower risk. In terms of differentiating prolific offending from those who had offended less

frequently, having engaged in multiple types of offences at age 14 was the only significant risk factor.

3 The Millennium Cohort Study

The Millennium Cohort Study (MCS) is a UK nationally representative birth cohort study following an initial sample of over 19,000 individuals born around the millennium (Sep 2000- Jan 2002).[15] The initial survey was at age 9 months, with follow-ups at ages 3, 5, 7, 11, 14 and 17. This longitudinal study is highly multidisciplinary with detailed information collected on individuals (cohort members) and their families. These include socioeconomic circumstances, family structure, childrearing environment, and parental characteristics, as well as social, cognitive, behavioural and health outcomes of cohort members at key developmental stages. In the initial survey, interviews with parents were solely relied on, but from age 3 cohort members were increasingly involved (initially via cognitive assessments and physical measurements), providing direct information on their experiences and activities from age 7. At ages 11, 14 and 17 they were asked about their involvement in a range of risky behaviours, including offending behaviours. The sample used in analyses in this report consist of 13,277 cohort members, the characteristics of whom are shown in Table 3.1.

Table 3.1: Descriptive statistics for the MCS sample (N=13,277)

SEX AT BIRTH	Female	48.4%
	Male	51.6%
ETHNICITY	White	84.4%
	Mixed	3.5%
	Indian	2.0%
	Pakistani & Bangladeshi	5.0%
	Black or Black British	3.5%
	Other incl Chinese	1.5%
HIGHEST EDUCATION IN HOUSEHOLD		
	No formal qualifications	10.4%
	NVQ 1	6.6%
	NVQ 2	27.0%
	NVQ 3	16.3%
	NVQ 4	33.2%
	NVQ 5	6.5%
FREE SCHOOL MEALS AGE 5 OR 7		
	No	77.4%
	Yes	22.6%
HOUSING TYPE AGE 11	Own outright or mortgage	59.7%
	Rent public or private	40.3%

UK COUNTRY	England	82.3%
	Wales	4.9%
	Scotland	8.7%
	Northern Ireland	4.1%

Note: Frequencies are based on imputed data, restoring missing data back to the age 11 sweep (see Appendix 3 for details). Further weights adjust for the survey design attrition between the birth sweep and age 11.

4 Methods

4.1 The sample

The total number of cohort members who have ever taken part in the MCS is 19,243. As in all longitudinal studies, over time some cohort members attrit from the study. At the age 17 survey, a total of 10,625 cohort members participated. In the age 17 survey, cohort members provided information on offending behaviours through a self-completion questionnaire as part of the main interview (around 9,500 responses), and through a self-completion online questionnaire after the interview (around 6,500 responses). To account for attrition and missing data, we use both attrition weights and multiple imputation to help 'restore' missing data.[16] Missing data was imputed back to the age 11 survey, which had just over 13,000 responses. Appendix C provides further information on missing data and multiple imputation. These methods ensure that the estimates provided in analyses are as close as possible to being nationally representative. The final analytical sample size for analysis is 13,277.

4.2 Offending behaviours

At age 17, cohort members were asked about their engagement in activities in the last 12 months, in relation to 14 offences, which can be further grouped into 7 offending types as shown in Table 4.1. In addition, information was obtained regarding police contact and gang membership, both of which are measured as lifetime prevalence. All offending variables are binary (yes/no). Most questions on offending activities were also included in the age 14 survey. For four of the offending types at age 17, frequencies of engagement in the last year were also reported. The exact wording of survey questions at age 14 and 17 are contained in Appendix A.

Table 4.1: Offending types and related activities in the past year at age 17

Offending types	Offending activities
WEAPON CARRYING AND USE	Carried a weapon in past year [a]
	Used a weapon in past year [a]
ASSAULT	Assault in past year [a]
SHOPLIFTING	Shoplifting in past year [a b]
NEIGHBOURHOOD CRIME	Breaking and entering in past year [a b]
	Vehicle theft in past year [b]
	Theft from person in past year [a]
CRIMINAL DAMAGE AND ARSON	Graffiti in past year [a b]
	Vandalism in past year [a b]
	Fire setting in past year [b]
CYBERCRIME	Hacked computer or device in past year [a b]
	Send virus, malware, or spyware in past year [a b]
ONLINE BULLYING, HARASSMENT	Online bullying in past year
	Online harassment in past year

Note: [a] Activity also measured at age 14, [b] Frequency of engagement in past year was obtained

4.3 Predictors of offending

Potential predictors of offending are examined from across a wide range of domains that make up the developmental ecology of individuals.[17] These include: individual characteristics, socioeconomic background, early childhood environment, family risks, school factors, peer factors, and area factors. In addition, behavioural factors measured in prior survey sweeps are examined, including: social media use and gaming, extra-curricular activities, school exclusion and truancy, child and adolescent mental health, substance use, and offending behaviours. Table 4.2 shows the full list of predictor variables. Further details on the measurement of these predictors are in Appendix B. All predictor variables examined are measured prior to age 17, which helps reduce reverse causality, though of course does not imply that the relationships are causal.

Table 4.2: Predictors of offending

INDIVIDUAL CHARACTERISTICS	Sex at birth
	Age
	Oldest child in household
	Ethnicity
SOCIOECONOMIC BACKGROUND	Household income weekly (average 9 months to age 11)
	Free school meals at age 5 or 7
	Highest education in household
	Housing type age 11
EARLY CHILDHOOD ENVIRONMENT	Breastfed ever
	Mother smoked during pregnancy after second month
	Age 3: Safety of home environment (observed)
	Age 3: Positive parenting (observed)
	Age 3: Parent-child relationship (parent reported)
FAMILY RISKS	Main parent mental health problems (9mths-11yrs)
	Domestic abuse between parents (9mths-11yrs)
	Main parent frequent drinker - age 9mths to 11yrs
	Main parent used recreational drugs age 3,5 or 14
	Death of a parent or sibling
	Main parent spent time in care as a child
	Age 11: Bullied by sibling
	Ever a single parent between 9mths and 11yrs
	Age 11: Number of siblings
SCHOOL FACTORS	School connectedness age 7 and 11
	Academic interest age 11
	Academic self-concept age 11
	Five or more A*-C GCSEs
	School exclusion in secondary between age 11 and 14
	Persistent truancy (more than just the once) past year at age 14
PEER FACTORS	Age 7: Number of friends
	Age 14: Time spent with friends in leisure time
	Age 14: Victim of peer bullying
	Age 11: Conflict with friends
	Age 14: Friends smoke cigarettes
	Age 14: Friends drink alcohol
	Age 14: Friends take drugs
AREA AND REGION	Age 11: Safety of area
	UK Country
	Region in England

CHILD AND ADOLESCENT MENTAL HEALTH	Childhood externalising problems (age 3-11) Childhood internalising problems (age 3-11) Age 14: Self-harm in past year
LEISURE ACTIVITIES AT AGE 14	Age 14: Social media time use per weekday Age 14: Electronic gaming time use per weekday Age 14: Organised activities (youth clubs/scouts/girl guides or other)
SUBSTANCE USE AT AGE 14	Age 14: Binge drinking in past year Age 14: Tried smoking ever Age 14: Tried cannabis ever Age 14: Tried hard drugs ever
OFFENCES AT AGE 14	Age 14: Weapons carrying/use Age 14: Assault in past year Age 14: Shoplifting in past year Age 14: Neighbourhood crime (breaking and entering, theft from person) Age 14: Criminal damage (graffiti, vandalism) Age 14: Cybercrime (hacking/virus) Age 14: Total number of offending types (out of 6 possible) Age 14: Ever a gang member

4.4 Analysis

Carrying or using a weapon at age 17

The analyses in this report focus on carrying or using a weapon at age 17 in the last year. This is first examined in term of the extent to which it overlaps with other types of offences at age 17 (assault, shoplifting, neighbourhood crime, criminal damage and arson, and cybercrime). Then, carrying or using a weapon is examined in terms of bivariate relationships to a wide range of potential predictors: individual characteristics, socioeconomic background, early childhood environment, family risks, area and region, school factors, peer factors, child and adolescent mental health, leisure activities, previous substance use, and previous offending.

In further models, multivariate prediction of carrying or using a weapon at age 17 is estimated using logistic regression, given the binary nature of the outcome variable. Estimates are odds ratios. In these models, only those variables that are significantly

associated with offending in the bivariate analyses are included as predictors. Further, where predictor variables measure similar concepts, only one is included in the model. For instance, household income is chosen over other measures of socioeconomic status as it is the strongest predictor in this domain. The regression models are estimated in stages, with blocks of predictor domains added incrementally: first individual characteristics, then family socioeconomic status, early childhood environment, and family risks. After these, adolescent behavioural factors from age 14 are added in turn: mental health, school factors, peer factors, social media/gaming, and substance use. In the final model, prior offending behaviours from age 14 are added, including weapon carrying or use. We refer to this as the lagged model, and because it controls for prior engagement in the outcome of interest (weapon carrying or use), its coefficients can be interpreted as predictors of *change* in weapon carrying or use between ages 14 and 17. Regression models are estimated separately for males and females.

Prevalence of offending at age 14 and 17

In the next section of analyses, a wider range of offending types (weapon carrying and use, assault, shoplifting, neighbourhood crime, criminal damage, and cybercrime) are examined in terms of change in engagement between age 14 and 17. The prevalence of each offending type (engagement in the preceding year) is estimated at each age.

This is followed by an examination of factors associated with change in offending between age 14 and 17. For these analyses, cohort members are grouped according to whether and when they have engaged in a particular type of offence: never, age 14 only, age 17 only, age 14 and 17. Multivariate multinomial logistic regression analyses are used to examine predictors of the groups, using never as the reference group. Models are entered in two steps, first individual characteristics and predictors from birth to age 3, followed by age 14 experiences and behaviours.

Prolific offending

The final set of analyses relates to prolific offending, which refers to a high frequency of engagement in offending over the course of a year. The concentration of offending

is first examined, which establishes to what extent the total number of offences carried out by cohort members collectively across four types of offences (criminal damage, shoplifting, neighbourhood crime, and cybercrime) is disproportionately distributed across the total sample of cohort members. The percentage of total offences is computed for those who had engaged in three or more offences in the last year, and the size of this prolific group is reported relative to the total sample.

In further analyses cohort members are categorised into four offending frequency groups: never, 1-2 times, 3-9 times, and 10 or more times. These categories are first examined in terms of their overlap with carrying or using a weapon. Then multinomial logistic regression is used to identify factors associated with these groups, using the prolific offender group as reference category against which the never and less prolific offender groups are compared. Variables are entered in three stages; the first model includes individual and family variables, and then behavioural factors are added in three further steps, with the final model including offending behavioural at age 14. Coefficients are risk ratios.

Weighting and imputation

Weights were used in the analyses to adjust for the sampling design of the initial survey and for attrition between the survey at birth and age 11,[18] and in addition multiple imputation was used to help restore missing data between age 11 and 17. At age 17, between 30% and 50% of data was imputed. Further details of the multiple imputation approach is provided in Appendix C, including illustration of the difference it makes to estimates. All analyses were carried out using STATA version 16.[19]

5 Carrying or using a weapon at age 17

The following examines age 17 offending, focusing especially on weapon carrying and use. Analyses for other offences (assault, shoplifting, neighbourhood crime, criminal damage, cybercrime, and online bullying) are presented in Appendices D and E.

5.1 Carrying or using a weapon at age 17 in relation to other offences at age 17

We first examine how carrying or using a weapon at age 17 overlaps with engagement in other offences at the same age. Presented in Table 5.1 is the prevalence of other offences by engagement in weapon carrying or use. We see that those who reported carrying or using a weapon had a much higher prevalence for all other offences, 66% had engaged in assault (versus 25% of those not carrying or using a weapon), 32% had shoplifted (vs 7%), 20% had committed neighbourhood crime (vs 1.8%), 51% had engaged in criminal damage and arson (vs 7%), 30% committed cybercrime (vs 3.4%), and 5% online bullying (vs 1.3%). Those carrying or using a weapon were also highly likely to have been involved in multiple types of other offences, 41% admitted to three or more types of other offences, and 26% were currently or previously member of a gang.

Table 5.1: Prevalence of other offences at age 17, by whether or not carrying or using a weapon at age 17

	Carrying or using a weapon at age 17			Not carrying or using a weapon at age 17		
		CI_min	CI_max		CI_min	CI_max
Age 17: Assault*	65.8%	60.2%	71.4%	24.6%	23.4%	25.7%
Age 17: Shoplifting*	31.6%	25.2%	37.9%	7.1%	6.3%	7.9%
Age 17: Neighbourhood crime (breaking and entering, theft from person, vehicle theft)*	19.5%	14.6%	24.5%	1.8%	1.5%	2.2%
Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)*	50.6%	43.9%	57.3%	6.8%	6.0%	7.6%
Age 17: Cybercrime (hacking/virus)*	29.7%	22.3%	37.1%	3.4%	2.7%	4.2%
Age 17: Online bullying/harassment*	5.3%	2.6%	8.0%	1.3%	1.0%	1.6%
Age 17: Total number of offending types (out of 6 possible)*						
None	19.7%	15.1%	24.3%	68.6%	67.3%	69.9%
One	21.8%	16.8%	26.7%	22.2%	21.2%	23.3%
Two	17.1%	12.5%	21.8%	5.1%	4.5%	5.8%
Three or more	41.4%	34.8%	48.1%	4.1%	3.4%	4.7%
Age 17: Ever a gang member*	25.9%	17.6%	34.2%	2.5%	1.9%	3.1%

*Indicates that groups differ statistically (p<.05)

5.2 Prevalence of carrying or using a weapon at age 17 in relation to other factors

This section presents the prevalence of carrying or using a weapon at age 17 along various dimensions measured prior to age 17. No other variables are controlled for, so these represent bivariate associations. Results for carrying or using a weapon are shown here, and for other types of offences results are in Appendix D.

Weapon carrying or use by individual characteristics

Table 5.2 reports the prevalence of carrying or using a weapon by individual characteristics of cohort members. The prevalence for males (8.8%) is more than double that of females (3.9%). Although the cohort members were very similar in age (all around 17) there was some variation in age to be explored, however there was no difference between groups in terms of carrying or using a weapon. There was also little difference by being the eldest child in the household or ethnicity in relation to prevalence of carrying or using a weapon.

Table 5.2: Prevalence of weapon carrying or use at age 17 by individual characteristics

	Prevalence of carrying or using a weapon	CI_min	CI_max
Sex*			
Female	3.9%	3.1%	4.8%
Male	8.8%	7.4%	10.2%
Age categories			
Under 17	6.5%	4.9%	8.2%
17-17.3	6.4%	5.2%	7.6%
17.3-17.5	6.1%	4.3%	7.9%
over 17.5	6.6%	4.5%	8.8%
Oldest child in household			
No	6.6%	5.4%	7.9%
Yes	6.1%	5.0%	7.3%
Ethnicity 6 categories			
White	6.6%	5.6%	7.5%
Mixed	7.7%	2.8%	12.6%
Indian	4.8%	0.5%	9.2%
Pakistani & Bangladeshi	4.9%	3.0%	6.8%
Black or Black British	5.9%	2.0%	9.8%
Other incl Chinese	4.2%	-1.3%	9.6%

*Indicates that groups differ statistically (p<.05)

Weapon carrying or use by socioeconomic background

Table 5.3 presents how carrying or using a weapon varies across a range of socioeconomic indicators. Cohort members from the 20% lowest income households, had a prevalence of 9.3% for carrying or using a weapon compared to 4.0% in the 20% highest income households. Similarly, for parental education the prevalence was 8.3% for those whose parents had no formal educational qualifications, compared to 2.9% among those with the highest level of education. Eligibility for free school meals and housing type showed a similar pattern, with a significant difference in the prevalence of weapon carrying or use between high and low socioeconomic status.

Table 5.3: Prevalence of weapon carrying or use at age 17 by socioeconomic background

	Prevalence of carrying or using a weapon	CI_min	CI_max
Household income weekly (average 9mths to age 11)*			
lowest 20%	9.3%	7.1%	11.5%
20-40%	7.8%	5.8%	9.8%
40-60%	5.6%	4.1%	7.2%
60-80%	4.9%	3.6%	6.1%
highest 80-100%	4.0%	2.7%	5.2%
Free school meals age 5 or 7*			
No	5.5%	4.7%	6.4%
Yes	9.5%	7.2%	11.8%
Highest education in household (categories)*			
No formal qualifications	8.3%	5.4%	11.1%
NVQ 1	7.8%	4.7%	10.9%
NVQ 2	8.1%	6.5%	9.8%
NVQ 3	6.0%	4.4%	7.7%
NVQ 4	5.1%	4.0%	6.1%
NVQ 5	2.9%	1.5%	4.4%
Highest education in household (binary)*			
Less than a degree	7.5%	6.3%	8.7%
Degree or higher	4.7%	3.8%	5.6%
Housing type age 11*			
Own outright or mortgage	4.7%	4.0%	5.5%
Rent public or private	8.9%	7.2%	10.6%

*Indicates that some differences across groups within this category are statistically significant (p<.05).
NVQ1=Three to four GCSEs at grades D-E, NVQ2=Four or five GCSEs at grades A*-C, NVQ3= Two or more A-levels, NVQ4=Degree, NVQ5=Master's degree or above.

Weapon carrying or use by early childhood environment

The relationship between carrying or using a weapon at age 17 and early childhood environment is shown in Table 5.4. A significantly higher prevalence of weapon carrying or use was seen for cohort members whose mothers reported smoking after the second month of pregnancy, 9.9% versus 5.7% for non-smokers. There was no significant difference for child ever having been breastfed. For home environment safety, positive parenting, and parent-child relationship, all measured at age 3, there appeared to be a linear relationship, although there was no statistically significant difference between groups with high and low levels, although for parent-child relationship the differences was close to being significant.

Table 5.4: Prevalence of weapon carrying or use at age 17 by early childhood environment

	Prevalence of carrying or using a weapon	CI_min	CI_max
Breastfed			
No	7.9%	6.3%	9.6%
Yes	5.7%	4.8%	6.6%
Mother smoked during pregnancy*			
No	5.7%	4.8%	6.6%
Yes	9.9%	7.5%	12.2%
Safety of home environment (observed) age 3			
Lowest	9.8%	5.6%	14.1%
Medium	7.2%	4.8%	9.6%
High	6.1%	5.2%	7.0%
Positive parenting (observed) age 3			
Lowest	10.0%	6.0%	13.9%
Medium	7.2%	5.0%	9.4%
High	5.9%	5.0%	6.8%
Parent-child relationship (parent reported) age 3†			
lowest 20% (poor relationship)	8.5%	6.5%	10.4%
20-40%	6.7%	4.9%	8.5%
40-60%	5.8%	4.3%	7.3%
60-80%	5.8%	4.0%	7.6%
highest 80-100% (good relationship)	5.4%	4.0%	6.7%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

† Indicates that some groups are close to being different statistically (p<.10).

Weapon carrying or use by family risks

Shown on Table 5.5 are family risks in relation to the prevalence of carrying or using a weapon at age 17. Cohort members whose main parent [i] had a high level of mental health problems throughout childhood, had a higher prevalence (8.4%) compared to those of parents with the best mental health (4.9%). Those from families where parents had indicated that domestic abuse had taken place were more likely to have carried or used a weapon, 8.6% compared to 5.8% of other young people. Those from homes where their main parent had used recreational drugs had almost twice the prevalence of carrying or using a weapon (11.4% vs 5.9%), and where the main parent had been in care as a child was also associated with a higher prevalence of carrying or using a weapon (12.1% vs 6.3%). Cohort members who had lived with a single parent during childhood had a higher

[i] The main parent is the primary respondent/informant in the survey and is usually the mother.

prevalence of carrying or using a weapon (8.8%) than those from two parent homes (4.9%). Parent frequent alcohol use, death of a parent or sibling, being bullied by a sibling, and number of siblings, did not seem to be significantly related to weapon carrying or use.

Table 5.5: Prevalence of weapon carrying or use at age 17 by family risks

	Prevalence of carrying or using a weapon	CI_min	CI_max
Main parent mental health problems (9mths-11yrs) *			
lowest 20% (good mental health)	4.9%	3.4%	6.3%
20-40%	5.3%	3.7%	6.9%
40-60%	5.8%	4.1%	7.4%
60-80%	7.4%	5.8%	9.0%
highest 80-100% (poor mental health)	8.4%	6.5%	10.4%
Indication of domestic abuse (9mths-11yrs) *			
No	5.8%	4.9%	6.7%
Yes	8.6%	6.7%	10.5%
Main parent frequent drinker - age 9mths to 11yrs			
No	6.3%	5.4%	7.3%
Yes	7.0%	5.1%	8.9%
Main parent used recreational drugs age 3,5 or 14*			
No	5.9%	5.0%	6.9%
Yes	11.4%	7.7%	15.2%
Death of a parent or sibling			
No	6.4%	5.5%	7.3%
Yes	6.6%	-0.9%	14.1%
Main parent spent time in care as a child*			
No	6.3%	5.4%	7.2%
Yes	12.1%	4.4%	19.8%
Bullied by sibling age 11			
No	5.7%	4.2%	7.2%
Yes	6.7%	5.6%	7.7%
Ever single parent (9mths and 11yrs) *			
No	4.9%	4.1%	5.8%
Yes	8.8%	7.1%	10.4%
Number of siblings age 11			
None	6.5%	4.6%	8.5%
1 sib	6.1%	5.0%	7.2%
2 sibs	6.6%	5.1%	8.1%
3 sibs	6.9%	4.6%	9.1%
3 or more	7.0%	3.5%	10.5%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by area and region

The prevalence of age 17 weapon carrying or use in relation to area safety and geographical region are shown in Table 5.6. There is no clear pattern with regards to

area safety (as perceived by the cohort member at age 11). Although the prevalence appears lower in Scotland and Northern Ireland, than in England and Wales, these differences are not significant as indicated by the overlapping confidence intervals, and nor do we observe substantial differences between regions of England.

Table 5.6: Prevalence of weapon carrying or use at age 17 by area and region

	Prevalence of carrying or using a weapon	CI_min	CI_max
Safety of area age 11			
Very safe	6.6%	5.2%	8.0%
Safe	6.2%	5.1%	7.3%
Not very safe	7.4%	4.9%	9.8%
Not at all safe	6.5%	0.2%	12.9%
UK country			
England	6.5%	5.5%	7.6%
Wales	6.7%	4.6%	8.7%
Scotland	5.5%	3.6%	7.4%
N.Ireland	5.8%	3.6%	7.9%
Regions in England			
North East	6.9%	2.9%	11.0%
North West	7.2%	5.0%	9.4%
Yorkshire and the Humber	5.8%	3.6%	7.9%
East Midlands	7.3%	3.6%	10.9%
West Midlands	6.1%	3.6%	8.6%
East of England	6.6%	4.2%	8.9%
London	5.7%	3.4%	7.9%
South East	6.8%	4.7%	9.0%
South West	6.7%	3.9%	9.4%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by school factors

A number of school factors were related to carrying or using a weapon in these bivariate examinations, shown in Table 5.7. Cohort members with the poorest level of school connectedness when at primary school, had a much higher prevalence of carrying or using a weapon (11.0%) than other young people, with the prevalence being lowest amongst those reporting the highest level of school connectedness (4.1%). Doing less well at school also seemed important, as those who achieved five or more GCSEs grade A-C had a prevalence of 4.6% for carrying or using a weapon compared to 8.8% those who achieved less than this. Finally, being excluded or truanting from school were very strong correlates of carrying or using a weapon at age 17. Around 20% of those who had been excluded said they had carried or used

a weapon, and the figure was the same for being truant, compared to just over 5% among cohort members who had not been excluded or truanted.

Table 5.7: Prevalence of weapon carrying or use at age 17 by school factors

	Prevalence of carrying or using a weapon	CI_min	CI_max
School connectedness age 7 and 11*			
lowest 20% (low connectedness)	11.0%	8.9%	13.1%
20-40%	6.8%	5.2%	8.5%
40-60%	5.1%	3.6%	6.6%
60-80%	4.7%	3.2%	6.2%
highest 80-100% (high connectedness)	4.1%	2.6%	5.5%
Academic interest age 11			
lowest	8.5%	5.8%	11.1%
2	6.8%	5.1%	8.5%
3	5.8%	4.4%	7.2%
4	6.2%	4.8%	7.6%
highest	6.0%	3.9%	8.0%
Academic self-concept age 11			
lowest	7.4%	5.7%	9.0%
2	6.0%	4.7%	7.3%
3	5.7%	4.2%	7.2%
highest	6.7%	5.3%	8.1%
Five or more A-C GCSEs*			
No	8.8%	7.4%	10.3%
Yes	4.6%	3.7%	5.4%
School exclusion in secondary between age 11 and 14*			
No	5.4%	4.6%	6.2%
Yes	20.2%	14.5%	25.9%
Persistent truancy (more than just the once) past year at age 14*			
No	5.6%	4.8%	6.5%
Yes	20.1%	14.3%	25.9%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by peer factors

Presented in Table 5.8 are results of examinations of a number of peer factors in relation to carrying or using a weapon. The prevalence of carrying or using a weapon for those spending a lot of time with peers in their spare time on most days was 8.5%, compared to 4.2% for those who see friends at least once a month, and 5.7% for those seeing friends at least one a week. All types of peer substance use at age 14 were predictive of carrying or using a weapon at age 17. Those with friends who drank alcohol had nearly twice the prevalence of carrying or using a weapon (8.1% versus 4.2%). For peer cigarette smoking the difference was even greater (10.3% versus 4.1%), whilst the strongest pattern was seen for peer drug taking with 12.5%

reporting having carried or used a weapon later at age 17, compared to 4.5% of those whose peers did not use drugs. Number of friends, being a victim of peer bullying, or frequency of conflict with friends were not significantly related to weapon carrying or use, although we do see linear patterns in the expected direction for these variables.

Table 5.8: Prevalence of weapon carrying or use at age 17 by peer factors

	Prevalence of carrying or using a weapon	CI_min	CI_max
Age 7: Number of friends			
Lots	6.2%	5.2%	7.2%
Some	6.5%	4.9%	8.0%
Not many	7.4%	5.0%	9.8%
Age 14: Time spent with friends in leisure time*			
Most days	8.5%	6.9%	10.1%
At least one a week	5.7%	4.5%	6.8%
At least once a month	4.2%	2.7%	5.6%
Less than once a month	4.7%	2.5%	6.9%
Age 14: Victim of peer bullying			
Never	5.6%	4.6%	6.6%
Less than every few months	6.5%	5.0%	8.0%
Once a month to every few months	7.9%	5.4%	10.4%
Most days to once a week	8.7%	6.1%	11.3%
Age 11: Conflict with friends			
Never	5.6%	4.1%	7.2%
Less than once a month	6.5%	5.3%	7.6%
At least once a month	6.3%	4.4%	8.2%
Most days or weekly	7.9%	5.9%	9.9%
Age 14: Friends smoke cigarettes*			
No	4.1%	3.3%	4.9%
Yes	10.3%	8.5%	12.0%
Age 14: Friends drink alcohol*			
No	4.2%	3.1%	5.3%
Yes	8.1%	6.9%	9.2%
Age 14: Friends take drugs*			
No	4.5%	3.6%	5.4%
Yes	12.5%	10.3%	14.7%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by child and adolescent mental health

As for carrying or using a weapon at age 17 in relation to child and adolescent mental health, bivariate results are shown in Table 5.9. Child externalising problems refer to conduct problems and hyperactivity, and child internalising problems are emotional problems (anxiety/depression) and peer problems (full measures for both scales are in Appendix B). Childhood externalising problems show a strong

relationship to carrying or using a weapon, as those with the 20% highest level of externalising problems had a prevalence of 10.4% for carrying or using a weapon, compared to just 3.4% of those with the 20% lowest level of externalising problems. The pattern with internalising problems is less clear, with no statistically significant differences between the quintile groups. Those who had self-harmed at age 14 had a significantly higher prevalence of carrying or using a weapon at age 17 (10.1%) compared to those who had not self-harmed (5.7%).

Table 5.9: Prevalence of weapon carrying or use at age 17 by child and adolescent mental health

	Prevalence of carrying or using a weapon	CI_min	CI_max
Childhood externalising problems (age 3-11)*			
lowest 20%	3.4%	2.1%	4.6%
20-40%	4.6%	3.3%	5.9%
40-60%	5.9%	4.3%	7.5%
60-80%	6.5%	4.8%	8.2%
highest 80-100%	10.4%	8.2%	12.6%
Childhood internalising problems (age 3-11)*			
lowest 20%	5.2%	3.6%	6.8%
20-40%	5.8%	4.3%	7.3%
40-60%	6.0%	4.4%	7.6%
60-80%	6.7%	4.9%	8.4%
highest 80-100%	7.9%	5.9%	9.9%
Age 14: Self-harmed in past year*			
No	5.7%	4.8%	6.6%
Yes	10.1%	7.7%	12.5%

*Indicates that some differences across groups within this category are statistically significant (p<.05))

Weapon carrying or use by leisure activities at age 14

Table 5.10 shows the prevalence of carrying or using a weapon in relation to cohort members' leisure activities at age 14. For social media use we observe a linear relationship, with a higher offending prevalence among high users of social media, that gradually decreases with social media usage; users spending 7 hours or more daily on social media had a prevalence of 9.5% versus 4.9% for those spending less than half an hour. A similar pattern is observed for electronic gaming; young people spending 7 hours or more on this activity on an average weekday at age 14 had a prevalence of 11.7% for carrying or using a weapon at age 17, compared to 3.8% for those spending less than half an hour gaming per weekday. Participation in activities

such as youth clubs or other organised activities was not found to be correlated with carrying or using a weapon.

Table 5.10: Prevalence of weapon carrying or use at age 17 by leisure activities at age 14

	Prevalence of carrying or using a weapon	CI_min	CI_max
Age 14: Social media time per weekday*			
None	4.9%	2.7%	7.2%
Less than half hour	4.9%	3.2%	6.5%
Half and hour to less than 1	5.7%	4.0%	7.4%
1 hour to less than 2	5.6%	3.8%	7.3%
2 hours to less than 3	6.7%	4.6%	8.8%
3 hours to less than 5	7.0%	4.9%	9.1%
5 hours to less than 7	7.5%	4.9%	10.1%
7 hours or more	9.5%	6.7%	12.2%
Age 14: Electronic gaming time per weekday*			
None	4.0%	2.6%	5.3%
Less than half hour	3.8%	2.2%	5.5%
Half and hour to less than 1	5.0%	2.9%	7.1%
1 hour to less than 2	6.0%	4.3%	7.7%
2 hours to less than 3	7.3%	5.3%	9.4%
3 hours to less than 5	8.2%	6.1%	10.3%
5 hours to less than 7	8.9%	5.6%	12.1%
7 hours or more	11.7%	8.0%	15.3%
Age 14: Organised activities (youth clubs/scouts/girl guides or other)			
Most days	7.6%	5.4%	9.8%
At least once a week	5.6%	4.1%	7.2%
At least once a month	7.7%	4.8%	10.7%
Several times a year	5.9%	2.8%	9.0%
Once a year or less	7.2%	4.8%	9.6%
Never or almost never	6.3%	5.0%	7.7%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by substance use at age 14

Presented in Table 5.11 is the prevalence of carrying or using a weapon by cohort member's use of substances earlier at age 14. For all types of substances, it shows that substance use at age 14 is related to a higher prevalence of this offence later at age 17. For those who had engaged in binge drinking the prevalence of carrying or using a weapon was 15.5% compared to 5.3% for those who had not done so. For regular smokers the prevalence was 25% versus 5.8% for those who did not smoke regularly. For those who had tried cannabis, 22.4% later reported weapon carrying or use, versus 5.4% of those who had never tried it; and for those who admitted to

trying harder drugs, 34.5% carried or used a weapon at age 17, compared to 6.1% who had not tried these types of substances.

Table 5.11: Prevalence of weapon carrying or use at age 17 by substance use at age 14

	Prevalence of carrying or using a weapon	CI_min	CI_max
Age 14: Binge drinking in past year*			
No	5.3%	4.5%	6.2%
Yes	15.8%	11.9%	19.8%
Age 14: Regular smoker*			
No	5.8%	4.9%	6.7%
Yes	24.9%	16.0%	33.7%
Age 14: Tried cannabis ever*			
No	5.4%	4.6%	6.2%
Yes	22.4%	16.0%	28.9%
Age 14: Tried hard drugs ever*			
No	6.1%	5.2%	7.0%
Yes	34.5%	17.8%	51.2%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

Weapon carrying or use by offending behaviours at age 14

This final section of bivariate relationships between carrying or using a weapon at age 17 examines offending behaviours at age 14. Results are shown in Table 5.12. All types of previous offences were strong indicators of carrying or using a weapon later at age 17. The strongest association was seen for carrying or using a weapon at age 14, where the prevalence for continued engagement at age 17 was 36.9% compared to 5.3% for other cohort members, so over seven times the prevalence. For other offending types (shoplifting, neighbourhood crime, criminal damage/arson, and cybercrime), age 14 engagement was associated with a four to five times increase in prevalence of weapon carrying or use at age 17. The weakest association was seen for assault at age 14 which was nevertheless associated with a threefold increase in prevalence (11.9% vs 3.9%). In addition, the prevalence was higher amongst the most prolific offenders at age 14, 33.8% of those who had admitted to three or more types of offending reported carrying or using a weapon later at age 17. Finally, the prevalence for those who had ever been a member of a gang was 29.0% compared to 5.4% for those with no gang association.

Table 5.12: Prevalence of weapon carrying or use at age 17 by offending behaviours at age 14

	Prevalence of carrying or using a weapon	CI_min	CI_max
Age 14: Weapon carrying/use*			
No	5.3%	4.4%	6.1%
Yes	36.9%	27.7%	46.0%
Age 14: Assault*			
No	3.9%	3.1%	4.7%
Yes	11.9%	9.9%	14.0%
Age 14: Shoplifting*			
No	5.6%	4.7%	6.4%
Yes	26.1%	18.8%	33.4%
Age 14: Neighbourhood crime (breaking and entering, theft from person)*			
No	6.0%	5.1%	6.9%
Yes	29.8%	18.1%	41.5%
Age 14: Criminal damage (graffiti, vandalism)*			
No	5.4%	4.6%	6.2%
Yes	23.4%	16.8%	30.0%
Age 14: Cybercrime (hacking/virus)*			
No	5.5%	4.7%	6.4%
Yes	21.7%	15.8%	27.6%
Age 14: Total number of offending types (out of 6 possible)*			
None	3.2%	2.5%	3.8%
One	8.0%	6.3%	9.7%
Two	16.7%	11.8%	21.5%
Three or more	33.8%	25.6%	42.0%
Age 14: Ever a gang member*			
No	5.4%	4.6%	6.3%
Yes	29.0%	20.8%	37.2%

*Indicates that some differences across groups within this category are statistically significant (p<.05)

5.3 Multivariate prediction of weapon carrying or use at age 17

In this section, results of the examination of weapon carrying or use at age 17 in multivariate prediction models are presented. Similar analyses for other offences are shown in Appendix E. Table 5.13 presents results for the sample overall. As described previously, variables are entered in incremental steps. This has the advantage of being able to study more distal aspects, such as structural factors in childhood, for example family socioeconomic circumstances (Model 2), before the addition of variables that may lie on the mediating or explanatory path between socioeconomic circumstances and carrying or using a weapon, such as family environment. Similarly, family environment can be studied (Model 3) prior to the addition of childhood mental health (Model 4), which are likely to be further mediators. From Model 5 onwards cohort members experiences and behaviours at age 14 are added. First mental health, then substance use, followed by school factors, and last peer factors in Model 9. The final step (Model 10) includes offending behaviours at age 14, including carrying or using a weapon, and therefore represents a lagged model, as the same previous behaviour is used to predict the current behaviour. Other variables in this lagged model therefore become predictors of change in carrying or using a weapon between age 14 and 17 and should only be interpreted as such.

Coefficients are reported as odd ratios (OR), with odds being the probability of an event occurring over it not occurring, and odds ratio is therefore the odds in one group compared to the odds in the reference group. An odds ratio greater than one means a higher likelihood in comparison to the reference group, so a risk factor for carrying or using a weapon, whilst an odds ratio below one signifies a lower likelihood and can be regarded as a protective factor against carrying or using a weapon. Care should be taken when interpreting the results of these models as a significant predictor variable does not mean that the relationship to weapon carrying or use is causal. However, because predictors are measured in the surveys prior to when the outcome is measured at age 17, this mitigates issues around reverse causality and thereby provides a more causally sound design than using predictors measured concurrent with the age 17 outcome. One should be mindful that the prevalence of carrying or using a weapon at age 17 is relatively uncommon, only

6.4%, which may cause issues of statistical power in these models, especially when a predictor variable also consists of a small group.

Of the variables entered in Model 9 - which include individual characteristics, family income, family environment, and experiences and behaviours at age 14 - significant risk factors for carrying or using a weapon at age 17 were: being male, use of substances at age 14, spending a lot of time on computer/electronic gaming at age 14, exclusion from school between age 11 and 14, and peers using multiple substance at age 14. These significant variables are largely age 14 experiences and behaviours and these appear to be mediators between other variables that were significantly associated with carrying or using a weapon in previous steps/models. These include low household income, domestic abuse between parents, childhood externalising problems, and self-harm in adolescence. The fact that these variables that were significant in the earlier models become non-significant when adding experiences and behaviours at age 14, does not mean that they are not related to carrying or using a weapon at age 17, but it suggests that their influence is occurring through shaping these later experiences. In other words, they are associated with weapon carrying or use at age 17, because they influence age 14 experiences and behaviours, which are in turn associated with carrying or using a weapon at age 17.

Finally, the lagged model (Model 10). We see that those who had carried or used a weapon at age 14 had over three times the odds of continuing their engagement at this later age. Other offences at age 14 that predicted an increase in weapon carrying or use between age 14 and 17 were assault and cybercrime, and gang membership by age 14 was also associated. Other significantly associated factors were being male and peer use of multiple substances at age 14. As above these should be interpreted as predictors associated with an increase in carrying or using a weapon between the two ages.

Sex differences

Presented in Tables 5.14 and 5.15 are results for males and females, respectively. To compare, we look at odds ratio coefficients rather than comparing levels of statistical significance. These show that results for males and females are broadly similar, in the sense that odds ratio coefficients are overlapping (confidence intervals

not shown but these have been inspected). This indicates that the drivers of weapon carrying or use are similar for males and female despite the prevalence of this type on offence being higher in males (8.8%) compared to females (3.9%) as reported previously (Table 5.3).

Table 5.13: Predictors of carrying or using a weapon at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**2.36*** **	**2.38*** **	**2.36*** **	**2.18*** **	**2.53*** **	**2.30*** **	**2.13*** **	**2.10*** **	**1.68** **	**2.53*** **
Oldest child in household	0.90	0.96	0.93	0.95	1.00	1.00	1.02	1.01	1.03	1.00
Cohort member age in months at age 17 survey	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99
Ethnicity (ref. White)										
Mixed	1.15	0.98	0.91	0.92	0.95	0.95	0.92	0.98	0.87	0.95
Indian	0.67	0.63	0.78	0.80	0.94	1.02	1.07	1.27	1.23	0.94
Pakistani and Bangladeshi	0.73	**0.51** **	0.71	0.77	0.92	0.98	1.03	1.25	1.08	0.92
Black or Black British	0.84	0.68	0.76	0.81	0.97	1.01	1.02	1.13	1.08	0.97
Other Ethnic group (incl. Chinese)	0.55	0.45	0.55	0.60	0.68	0.71	0.73	0.86	0.68	0.68
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		**2.77*** **	**1.73***	1.59+	1.57+	1.57+	1.48	1.31	1.32	1.34
20-40%		**2.16*** **	1.57+	1.48+	1.46	1.44	1.38	1.30	1.30	1.33
40-60%		**1.47***	1.23	1.19	1.17	1.18	1.13	1.12	1.11	1.14
60-80% highest		1.26	1.19	1.16	1.15	1.16	1.13	1.13	1.12	1.11
FAMILY ENVIRONMENT										
Breastfed			0.89	0.93	0.90	0.90	0.91	0.94	0.94	0.94
Mother smoked during pregnancy			1.25	1.22	1.20	1.11	1.10	1.08	1.06	1.06
Parent-child relationship (parent reported) age 3 [a]			0.95	1.05	1.04	1.04	1.03	1.02	1.02	1.01
Main parent mental health problems (9mths-11yrs) [a]			1.06	1.05	1.04	1.04	1.04	1.05	1.04	1.08
Domestic abuse between parents (9mths-11yrs)			**1.36***	**1.35***	**1.34***	1.27	1.27	1.25	1.24	1.22
Main parent used recreational drugs (age 3,5 or 14)			1.47+	1.48+	1.41	1.25	1.24	1.19	1.17	1.12
Ever single parent between 9mths and 11yrs			1.29	1.27	1.26	1.17	1.15	1.11	1.08	1.06
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				**1.32*** **	**1.29** **	**1.22***	**1.20***	1.12	1.10	1.06
Childhood internalising problems (age 3-11) [a]				0.87	0.87	0.90	0.91	0.91	0.92	0.93
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**2.09*** **	**1.61** **	**1.55** **	**1.50***	1.39+	1.08
SUBSTANCE USE AT AGE 14										

Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)					
One type of substance	**2.06*** **	**1.97*** **	**1.82** **	**1.49***	1.19
Two or three types of substances	**3.87*** **	**3.75*** **	**2.63*** **	**2.08** **	0.98
SOCIAL MEDIA AND GAMING AT AGE 14					
Age 14: Social media time use [b]		1.42	1.34	1.09	0.99
Age 14: Computer/electronic gaming time use [b]		1.68+	**1.74***	**1.75***	1.67+
SCHOOL FACTORS					
Five A to C GCSEs			0.80	0.81	0.79+
School exclusion in secondary between age 11 and 14			**1.86***	**1.77***	1.61+
Persistent truancy (more than just the once) past year at age 14			1.47	1.42	0.90
PEER FACTORS AT AGE 14					
Age 14: Spending time with friends in leisure time on most days				1.15	1.12
Age 14: Victim of peer bullying				1.13	1.00
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)					
One type of substance				1.36	1.25
Two or three types of substances				**1.99*** **	**1.64***
OFFENDING BEHAVIOURS AT AGE 14					
Age 14: Weapon carrying/ use					**3.32*** **
Age 14: Assault					**1.57** **
Age 14: Shoplifting					**1.65+**
Age 14: Neighbourhood crime (breaking and entering, theft from person)					1.09
Age 14: Criminal damage (graffiti, vandalism)					1.01
Age 14: Cybercrime (hacking/virus)					**1.95** **
Age 14: Gang member ever					**2.13***

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table 5.14: Predictors of carrying or using a weapon at age 17 for males: results of multivariate logistic regression (N=6,708)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Oldest child in household	0.94	1.00	0.96	0.98	0.98	1.04	1.05	1.06	1.06	1.08
Cohort member age in months at age 17 survey	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99
Ethnicity (ref. White)										
Mixed	1.08	0.93	0.85	0.87	0.88	0.90	0.90	0.88	0.93	0.82
Indian	0.73	0.68	0.83	0.86	0.90	1.00	1.08	1.15	1.37	1.36
Pakistani and Bangladeshi	0.75	0.53*	0.74	0.81	0.85	0.94	1.01	1.07	1.28	1.13
Black or Black British	0.85	0.70	0.77	0.81	0.84	0.94	0.99	1.00	1.09	1.08
Other Ethnic group (incl. Chinese)	0.53	0.44	0.55	0.60	0.61	0.64	0.66	0.68	0.80	0.60
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		2.71***	1.67+	1.54	1.53	1.56	1.49	1.30	1.30	1.35
20-40%		2.04**	1.46	1.39	1.38	1.37	1.31	1.22	1.20	1.26
40-60%		1.48+	1.23	1.19	1.18	1.19	1.14	1.12	1.11	1.16
60-80% highest		1.28	1.20	1.17	1.17	1.19	1.15	1.15	1.13	1.11
FAMILY ENVIRONMENT										
Breastfed			0.89	0.93	0.91	0.91	0.92	0.94	0.93	0.94
Mother smoked during pregnancy			1.19	1.16	1.14	1.05	1.04	1.03	1.01	1.05
Parent-child relationship (parent reported) age 3 [a]			0.95	1.05	1.05	1.05	1.04	1.03	1.03	1.02
Main parent mental health problems (9mths-11yrs) [a]			1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.09
Domestic abuse between parents (9mths-11yrs)			1.39*	1.37+	1.36+	1.28	1.28	1.26	1.25	1.24
Main parent used recreational drugs (age 3,5 or 14)			1.37	1.38	1.34	1.18	1.19	1.15	1.10	1.02
Ever single parent between 9mths and 11yrs			1.36	1.34	1.33	1.22	1.19	1.15	1.11	1.06
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				1.34**	1.32**	1.23*	1.21*	1.12	1.10	1.07
Childhood internalising problems (age 3-11) [a]				0.86	0.86	0.90	0.90	0.90	0.92	0.93
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					1.99**	1.51+	1.47+	1.37	1.29	0.93
SUBSTANCE USE AT AGE 14										

Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)					
One type of substance	2.28***	2.17**	2.00**	1.62*	1.26
Two or three types of substances	4.35***	4.17***	2.81**	2.16*	1.03
SOCIAL MEDIA AND GAMING AT AGE 14					
Age 14: Social media time use [b]		1.44	1.37	1.09	0.97
Age 14: Computer/electronic gaming time use [b]		1.65	1.75	1.78+	1.67
SCHOOL FACTORS					
Five A to C GCSEs			0.79	0.80	0.75+
School exclusion in secondary between age 11 and 14			1.79*	1.71*	1.59+
Persistent truancy (more than just the once) past year at age 14			1.53	1.48	0.92
PEER FACTORS AT AGE 14					
Age 14: Spending time with friends in leisure time on most days				1.11	1.08
Age 14: Victim of peer bullying				1.04	0.91
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)					
One type of substance				1.48+	1.34
Two or three types of substances				2.22***	1.79**
OFFENDING BEHAVIOURS AT AGE 14					
Age 14: Weapon carrying/use					3.26***
Age 14: Assault in past year					1.68**
Age 14: Shoplifting in past year					1.57
Age 14: Neighbourhood crime (breaking and entering, theft from person)					1.10
Age 14: Criminal damage (graffiti, vandalism)					0.98
Age 14: Cybercrime (hacking/virus)					2.09**
Age 14: Gang member ever					1.94*

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table 5.15: Predictors of carrying or using a weapon at age 17 for females: results of multivariate logistic regression (N=6,569)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Oldest child in household	0.80	0.87	0.85	0.86	0.86	0.90	0.91	0.92	0.92	0.94
Cohort member age in months at age 17 survey	1.00	1.00	0.99	1.00	1.00	0.99	0.99	0.99	0.98	0.98
Ethnicity (ref. White)										
Mixed	1.26	1.06	1.02	1.02	1.02	1.03	1.04	0.97	1.06	0.92
Indian	0.41	0.41	0.52	0.52	0.59	0.64	0.70	0.72	0.80	0.74
Pakistani and Bangladeshi	0.66	0.45+	0.64	0.68	0.81	0.87	0.91	0.94	1.12	0.94
Black or Black British	0.78	0.62	0.71	0.76	0.93	1.01	1.03	1.06	1.20	1.05
Other Ethnic group (incl. Chinese)	0.40	0.33	0.38	0.40	0.45	0.52	0.56	0.58	0.65	0.60
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		2.87**	1.84	1.69	1.63	1.58	1.46	1.33	1.37	1.30
20-40%		2.44**	1.80	1.70	1.62	1.60	1.50	1.49	1.51	1.42
40-60%		1.43	1.22	1.18	1.15	1.15	1.10	1.10	1.11	1.08
60-80% highest		1.21	1.15	1.12	1.11	1.09	1.06	1.08	1.09	1.04
FAMILY ENVIRONMENT										
Breastfed			0.90	0.93	0.89	0.89	0.90	0.94	0.95	0.95
Mother smoked during pregnancy			1.38	1.35	1.34	1.22	1.21	1.19	1.17	1.07
Parent-child relationship (parent reported) age 3 [a]			0.95	1.04	1.03	1.02	1.01	1.01	1.00	0.99
Main parent mental health problems (9mths-11yrs) [a]			1.03	1.03	1.01	1.01	1.01	1.01	1.01	1.05
Domestic abuse between parents (9mths-11yrs)			1.30	1.28	1.29	1.23	1.23	1.22	1.21	1.18
Main parent used recreational drugs (age 3,5 or 14)			1.67	1.68	1.55	1.38	1.36	1.28	1.31	1.35
Ever single parent between 9mths and 11yrs			1.19	1.17	1.13	1.08	1.07	1.05	1.02	1.06
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				1.27+	1.24	1.20	1.18	1.11	1.08	1.06
Childhood internalising problems (age 3-11) [a]				0.91	0.90	0.92	0.93	0.92	0.92	0.92
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					2.20***	1.79*	1.72*	1.70*	1.52	1.26
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						1.58	1.53	1.41	1.20	1.04

Two or three types of substances	3.06***	3.04***	2.26*	1.87	0.89
SOCIAL MEDIA AND GAMING AT AGE 14					
Age 14: Social media time use [b]		1.33	1.27	1.06	1.00
Age 14: Computer/electronic gaming time use [b]		1.72	1.71	1.64	1.67
SCHOOL FACTORS					
Five A to C GCSEs			0.84	0.84	0.87
School exclusion in secondary between age 11 and 14			2.06	2.00	1.71
Persistent truancy (more than just the once) past year at age 14			1.39	1.36	0.91
PEER FACTORS AT AGE 14					
Age 14: Spending time with friends in leisure time on most days				1.27	1.20
Age 14: Victim of peer bullying				1.38	1.23
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)					
One type of substance				1.08	1.01
Two or three types of substances				1.53	1.30
OFFENDING BEHAVIOURS AT AGE 14					
Age 14: Weapons carrying/use					3.90*
Age 14: Assault in past year					1.33
Age 14: Shoplifting in past year					1.93
Age 14: Neighbourhood crime (breaking and entering, theft from person)					1.13
Age 14: Criminal damage (graffiti, vandalism)					1.02
Age 14: Cybercrime (hacking/virus)					1.65
Age 14: Gang member ever					2.46+

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

6 Change in prevalence of offending between age 14 and 17

6.1 Prevalence of offending at age 14 and 17

Table 6.1 shows prevalence for each offending type and for each activity making up these types at age 14 and 17. Note that not all activities are available at age 14. Generally, there is an increase in the prevalence of offending as cohort members transit from mid adolescence to late adolescence. More specifically, carrying or using a weapon increased from 3.7% to 6.4%, shoplifting increased from 4.1% to 8.7%, theft from person from 1.5% to 2.6%, graffiti 3.2% to 4.8%, and vandalism 3.9% to 5.6%. For some offences there was no real change, for example breaking and entering property remained very low at 0.3% at both ages, and cybercrime was 5.6% at age 14 and 5.1% at age 17, with overlapping confidence intervals. The only offence showing a decrease across age/time was assault, from 31.7% at age 14 to 27.2% at age 17.

Table 6.1: Prevalence of offending at age 14 and 17 (prevalence in the last year)

	Age 14			**Age 17**		
	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max
Weapons carrying/use in past year	**3.7%**	3.2%	4.2%	**6.4%**	5.5%	7.3%
Carried a weapon in past year	3.1%	2.6%	3.5%	5.7%	4.8%	6.6%
Used a weapon in past year	1.3%	1.0%	1.6%	1.7%	1.3%	2.1%
Assault in past year	**31.7%**	30.6%	32.8%	**27.2%**	26.0%	28.4%
Shoplifting in past year	**4.1%**	3.6%	4.6%	**8.7%**	7.8%	9.6%
Neighbourhood crime (breaking and entering, vehicle crime, theft from person) in past year	**-**			**3.0%**	2.5%	3.5%
Breaking and entering in past year	0.3%	0.1%	0.4%	0.3%	0.1%	0.4%
Vehicle theft in past year	-			0.6%	0.3%	0.8%
Theft from person in past year	1.5%	1.2%	1.8%	2.6%	2.1%	3.1%

	Age 14			Age 17		
	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max
Criminal damage and arson (graffiti, vandalism, fire setting) in past year	**-**			**9.6%**	8.7%	10.5%
Graffiti in past year	3.2%	2.8%	3.7%	4.8%	4.1%	5.5%
Vandalism in past year	3.9%	3.4%	4.5%	5.6%	4.8%	6.4%
Fire setting in past year	-			5.2%	4.6%	5.9%
Cybercrime (hacking/virus) in past year	**5.6%**	5.0%	6.1%	**5.1%**	4.5%	5.8%
Hacked computer or device in past year	5.2%	4.6%	5.8%	5.0%	4.3%	5.7%
Sent virus, malware or spyware in past year	1.1%	0.8%	1.4%	1.6%	1.0%	2.2%
Online bullying, harassment in past year				**3.4%**	2.9%	3.9%
Online bullying in past year				1.6%	1.2%	1.9%
Online harassment in past year				2.2%	1.8%	2.6%

Table 6.2 shows the additional offending-related experiences, police contact and gang membership, measured at both ages and each reflecting lifetime prevalences. All types of police contact showed an increase: having ever been stopped by the police was up from 15.8% at age 14 to 23.45% at age 17, cautioning from 9.1% to 11.6%, and arrest from 1.4% to 3.8%. Gang membership remained stable at around 4% at both ages. As these are all lifetime prevalences, we expect them to increase with age or remain stable.

Table 6.2: Prevalence of gang membership and police contact at age 14 and 17 (lifetime prevalence)

	Age 14			Age 17		
	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max
Gang member ever	**4.2%**	3.6%	4.7%	**4.0%**	3.1%	4.9%
Police contact						
Stopped by police ever	15.8%	14.8%	16.7%	23.4%	22.1%	24.8%
Cautioned by police ever	9.1%	8.2%	9.9%	11.6%	10.5%	12.6%
Arrested by police ever	1.4%	1.1%	1.8%	3.8%	3.0%	4.7%

6.2 Examination of change in offending between age 14 and 17

This section further examines the change in offending between age 14 and age 17. Shown in Table 6.3 are the percentages of cohort members who have engaged in each offence at age 14 only, at age 17 only, at both ages, and at neither age. Four offending types are included here (weapon carrying/use, assault, shoplifting, and cybercrime) as not all items making up criminal damage/arson and online bullying/harassment were available at age 14. Across all offending types and the activities making up these, the majority had not taken part at either age. For most offences, those who had engaged tended to have done this at age 17 only (uptake), the second largest group were age 14 only, whilst a much smaller proportion had engaged both at age 14 and 17 (persisting). For example, for carrying or using a weapon, 91.3% had never done this, 2.3% had done so at age 14 only, 5.1% did this at age 17 only, and 1.4% engaged at both ages. A notable exception to this general pattern was assault; the 'persistent' group (around 16%) was as large as age 14 only, whilst the lowest was at age 17 only with 11.4%. The overall message to take from this is that persistent offending (engagement at both ages) within the same type of offence is not very common, though slightly more common for assault.

Table 6.3: Desistance, persistence, and uptake of offending between age 14 and 17

	Never	Age 14 only	Age 17 only (uptake)	Both age 14 and 17 (persisting)
OFFENDING TYPES				
Weapon carrying/use in past year	**91.3%**	**2.3%**	**5.1%**	**1.4%**
Carried a weapon in past year	92.4%	1.9%	4.5%	1.1%
Used a weapon in past year	97.3%	1.0%	1.4%	0.2%
Assault in past year	**56.9%**	**16.0%**	**11.4%**	**15.8%**
Shoplifting in past year	88.6%	2.7%	7.3%	1.4%
Cybercrime (hacking/virus) in past year	**90.4%**	**4.5%**	**4.0%**	**1.1%**
Hacked computer or device in past year	90.8%	4.2%	4.0%	1.0%
Send virus, malware, or spyware in past year	97.5%	0.9%	1.4%	0.2%

In terms of identifying factors related to these groups of young people engaging in offending behaviours at age 14 or age 17, or at both ages, results of multinomial logistic regression analyses are shown in Tables 6.4 to 6.7 for the four types of

offences, respectively. Coefficients shown are risk ratios (RR), with the risk ratio being the probability (or risk) of the outcome falling in one group in relation to the probability in the reference group. The reference group here are those who have never engaged at either age. A risk ratio larger than one for a predictor variable in the model indicates a higher risk of belonging to a group (e.g., persistent offending) compared to the reference category (never), whilst a value lower than 1 indicates a lower risk. Caution must be taken in the interpretation of these results because of the very small groups, especially that of persistent offending. Another word of caution is in relation to age 14 behavioural predictors; the fact that they are concurrent with the age 14 only group and the group engaging both at age 14 and 17 may lead to a larger association with those groups than the age 17 only group.

Nevertheless, despite these limitations, some patterns were strong and repeated across the four offending types. From Tables 6.4 to 6.7 we see that, generally, there is a similarity between those engaged at age 14 only, and those who engaged at both ages 14 and 17, as these groups tend to differ more from the reference group (never engaged), than the age 17 only group. For all four types of offences, being male was associated with a much higher risk of having engaged at any age, but especially having engaged persistently at both ages. Males had over 4 times the risk of persistent weapon carrying or use than females, for persistent assault the risk for males was nearly 6 times greater, for persistent shoplifting just over 3 times, and persistent cybercrime around twice as high. Other factors that were significant across all four type of offences, especially for predicting age 14 limited offending and persistent offending, but less so for age 17 only engagement, were self-harm, substance use (especially use of multiple substances), truancy, and peer substance use. Note that other significant associations shown must be treated with caution due to extremely low prevalences in the explanatory variables (these are italicised in the table).

Table 6.4 Predictors of engagement in carrying or using a weapon between age 14 and 17: results of multinomial logistic regression model

	Ref is never		
	Age 14 only	**Age 17 only**	**Both age 14 and 17**
	RR	RR	RR
INDIVIDUAL CHARACTERISTICS			
Male	**2.90*** **	**1.95*** **	**4.30*** **
Oldest child in household	0.83	1.06	0.77
Cohort member age in months at age 17 survey	0.99	0.99	0.96
Ethnicity (ref. White)			
Mixed	0.91	0.90	1.18
Indian	0.52	1.33	0.60
Pakistani and Bangladeshi	***2.30****	1.18	2.29
Black or Black British	1.12	1.22	0.08
Other Ethnic group (incl. Chinese)	3.81	0.89	0.01
FAMILY SOCIOECONOMICS			
20% lowest	0.83	1.30	1.44
20-40%	0.91	1.29	1.36
40-60%	0.94	1.12	1.11
60-80% highest	0.91	1.07	1.43
FAMILY ENVIRONMENT			
Breastfed	0.92	0.97	0.77
Mother smoked during pregnancy	1.19	1.06	1.14
Parent-child relationship (parent reported) age 3 [a]	1.09	1.03	0.98
Main parent mental health problems (9mths-11yrs) [a]	0.88	1.04	0.98
Domestic abuse between parents (9mths-11yrs)	1.10	1.22	1.34
Main parent used recreational drugs (age 3,5 or 14)	1.50	1.25	1.11
Ever single parent between 9mths and 11yrs	1.07	1.06	1.15
CHILDHOOD MENTAL HEALTH			
Childhood externalising problems (age 3-11) [a]	1.08	1.10	1.11
Childhood internalising problems (age 3-11) [a]	0.93	0.90	0.98
ADOLESCENT MENTAL HEALTH			
Age 14: Self-harmed in past year	**2.99*** **	1.32	**2.50** **
SUBSTANCE USE AT AGE 14			
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)			
One type of substance	**1.94***	1.36	**2.73** **
Two or three types of substances	**3.92*** **	1.46	**8.04*** **
SOCIAL MEDIA AND GAMING AT AGE 14			
Age 14: Social media time use [b]	1.01	1.10	1.03
Age 14: Computer/electronic gaming time use [b]	1.29	***1.87****	1.51
SCHOOL FACTORS			
Five A to C GCSEs	0.89	0.77+	1.00
School exclusion in secondary between age 11 and 14	1.63	***1.86****	1.89
Persistent truancy (more than just the once) past year at age 14	**2.89*** **	1.32	**2.58***
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days	1.09	1.15	1.17
Age 14: Victim of peer bullying	1.70*	1.10	1.53
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance	1.92+	1.32	2.12
Two or three types of substances	**2.66** **	**1.92*** **	3.48+

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

Table 6.5 Predictors of engagement in <u>assault</u> between age 14 and 17: results of multinomial logistic regression model

	Ref is never		
	Age 14 only	**Age 17 only**	**Both age 14 and 17**
	RR	RR	RR
INDIVIDUAL CHARACTERISTICS			
Male	**2.89*** **	**2.32*** **	**5.87*** **
Oldest child in household	1.01	1.12	1.01
Cohort member age in months at age 17 survey	1.01	0.98+	0.99
Ethnicity (ref. White)			
Mixed	1.49+	***1.61****	***1.59****
Indian	1.49	1.23	***1.80****
Pakistani and Bangladeshi	***1.90*** **	1.16	***1.80**** *
Black or Black British	***3.04*** **	***1.73****	***2.90*** **
Other Ethnic group (incl. Chinese)	1.07	1.36	1.73
FAMILY SOCIOECONOMICS			
20% lowest	1.00	0.81	0.80
20-40%	0.95	0.83	0.90
40-60%	1.04	0.79+	0.80
60-80% highest	0.97	0.92	0.97
FAMILY ENVIRONMENT			
Breastfed	1.09	1.04	1.06
Mother smoked during pregnancy	0.99	1.12	0.89
Parent-child relationship (parent reported) age 3 [a]	1.03	1.04	1.07
Main parent mental health problems (9mths-11yrs) [a]	1.02	1.04	1.00
Domestic abuse between parents (9mths-11yrs)	1.09	1.16	***1.21****
Main parent used recreational drugs (age 3,5 or 14)	1.27+	1.20	***1.53****
Ever single parent between 9mths and 11yrs	1.02	0.99	1.20
CHILDHOOD MENTAL HEALTH			
Childhood externalising problems (age 3-11) [a]	***1.14****	1.10	**1.24*** **
Childhood internalising problems (age 3-11) [a]	0.94	0.92	***0.86****
ADOLESCENT MENTAL HEALTH			
Age 14: Self-harmed in past year	**1.46*** **	1.23	**1.78*** **
SUBSTANCE USE AT AGE 14			
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)			
One type of substance	**1.57** **	**1.42***	**2.12*** **
Two or three types of substances	**1.89** **	1.42	**2.61*** **
SOCIAL MEDIA AND GAMING AT AGE 14			
Age 14: Social media time use [b]	***1.46****	1.18	***2.15*** **
Age 14: Computer/electronic gaming time use [b]	1.22	1.35+	***1.54****
SCHOOL FACTORS			
Five A to C GCSEs	1.07	0.87	***1.25****
School exclusion in secondary between age 11 and 14	***1.73*** **	1.11	***2.07*** **
Persistent truancy (more than just the once) past year at age 14	**1.75** **	0.97	**2.00*** **
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days	1.08	0.94	1.06
Age 14: Victim of peer bullying	***2.01*** **	1.15	***2.20*** **
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance	**1.59*** **	1.25+	**1.85*** **
Two or three types of substances	**2.52*** **	**1.45*** **	**2.90*** **

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

Table 6.6 Predictors of engagement in <u>shoplifting</u> between age 14 and 17: results of multinomial logistic regression model

	Ref is never		
	Age 14 only	**Age 17 only**	**Both age 14 and 17**
	RR	RR	RR
INDIVIDUAL CHARACTERISTICS			
Male	**1.85****	**1.60****	**3.26*****
Oldest child in household	0.98	1.01	1.33
Cohort member age in months at age 17 survey	0.99	1.01	1.00
Ethnicity (ref. White)			
Mixed	1.62	1.43	1.11
Indian	0.70	0.67	0.98
Pakistani and Bangladeshi	0.55	0.60	0.34
Black or Black British	1.76	1.27	1.73
Other Ethnic group (incl. Chinese)	3.07+	1.10	3.06
FAMILY SOCIOECONOMICS			
20% lowest	1.31	0.91	1.17
20-40%	1.16	0.96	0.95
40-60%	1.12	1.04	1.05
60-80% highest	1.08	0.96	1.12
FAMILY ENVIRONMENT			
Breastfed	1.35	1.00	***2.01****
Mother smoked during pregnancy	0.73	0.87	0.79
Parent-child relationship (parent reported) age 3 [a]	0.96	1.00	1.05
Main parent mental health problems (9mths-11yrs) [a]	0.89	1.08	1.06
Domestic abuse between parents (9mths-11yrs)	1.28	1.02	1.53+
Main parent used recreational drugs (age 3,5 or 14)	0.84	***1.57****	1.05
Ever single parent between 9mths and 11yrs	0.96	1.10	1.07
CHILDHOOD MENTAL HEALTH			
Childhood externalising problems (age 3-11) [a]	0.95	1.05	0.92
Childhood internalising problems (age 3-11) [a]	1.08	0.88+	0.87
ADOLESCENT MENTAL HEALTH			
Age 14: Self-harmed in past year	**2.07*****	**1.55****	**2.42****
SUBSTANCE USE AT AGE 14			
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)			
One type of substance	**2.64*****	1.37+	**4.12*****
Two or three types of substances	**8.74*****	1.37	**10.96*****
SOCIAL MEDIA AND GAMING AT AGE 14			
Age 14: Social media time use [b]	1.43	1.09	1.15
Age 14: Computer/electronic gaming time use [b]	1.15	0.89	0.83
SCHOOL FACTORS			
Five A to C GCSEs	1.02	0.86	1.40
School exclusion in secondary between age 11 and 14	1.61+	1.15	1.18
Persistent truancy (more than just the once) past year at age 14	**2.35*****	1.21	**3.74*****
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days	1.29	1.14	1.15
Age 14: Victim of peer bullying	1.31	1.13	1.41
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance	1.57	1.22	1.27
Two or three types of substances	**3.89*****	**1.69****	**3.61****

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

Table 6.7 Predictors of engagement in cybercrime between age 14 and 17: results of multinomial logistic regression model

	Ref is never		
	Age 14 only	**Age 17 only**	**Both age 14 and 17**
	RR	RR	RR
INDIVIDUAL CHARACTERISTICS			
Male	**1.43***	**1.46***	**2.41***
Oldest child in household	1.01	1.09	1.04
Cohort member age in months at age 17 survey	1.00	1.02	1.00
Ethnicity (ref. White)			
Mixed	1.79+	1.00	1.16
Indian	1.04	0.58	1.65
Pakistani and Bangladeshi	1.57	0.59	0.52
Black or Black British	0.44	1.10	1.62
Other Ethnic group (incl. Chinese)	1.72	0.34	0.00
FAMILY SOCIOECONOMICS			
20% lowest	0.73	0.95	0.59
20-40%	0.73	0.92	0.64
40-60%	0.70+	0.97	0.62
60-80% highest	0.89	0.92	0.93
FAMILY ENVIRONMENT			
Breastfed	0.96	0.94	0.74
Mother smoked during pregnancy	1.16	0.90	1.02
Parent-child relationship (parent reported) age 3 [a]	0.94	1.01	1.06
Main parent mental health problems (9mths-11yrs) [a]	0.86+	1.03	0.96
Domestic abuse between parents (9mths-11yrs)	1.09	1.21	1.20
Main parent used recreational drugs (age 3,5 or 14)	0.94	0.78	0.76
Ever single parent between 9mths and 11yrs	1.18	1.09	1.57
CHILDHOOD MENTAL HEALTH			
Childhood externalising problems (age 3-11) [a]	0.95	1.06	0.94
Childhood internalising problems (age 3-11) [a]	1.02	1.04	1.08
ADOLESCENT MENTAL HEALTH			
Age 14: Self-harmed in past year	**1.74*****	1.48+	**2.15***
SUBSTANCE USE AT AGE 14			
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)			
One type of substance	**2.15*****	1.40	1.82
Two or three types of substances	**3.16*****	1.17	**4.19****
SOCIAL MEDIA AND GAMING AT AGE 14			
Age 14: Social media time use [b]	***1.75****	1.08	2.32
Age 14: Computer/electronic gaming time use [b]	***2.24****	1.54	***5.39****
SCHOOL FACTORS			
Five A to C GCSEs	1.17	1.02	1.11
School exclusion in secondary between age 11 and 14	0.78	***1.96****	0.83
Persistent truancy (more than just the once) past year at age 14	**2.01****	0.89	**2.87***
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days	0.97	1.02	0.77
Age 14: Victim of peer bullying	***1.43****	1.02	1.47
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance	**1.50***	1.15	1.12
Two or three types of substances	**2.38*****	1.26	1.82

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

7 Prolific offending at age 17

This section focuses on prolific offending (frequency of offending) at age 17 in the past year. This was reported for four of the offending types (criminal damage, shoplifting, neighbourhood crime, and cybercrime). An overall measure of frequency across all types of offences is used in the prediction model because of the low frequency for individual offences.

7.1 Concentration of offending

Shown in Tables 7.1 to 7.5 is the concentration of offences. These analyses are on unimputed data as it was not possible to impute the exact frequency value for offences, which was required to add up the total number of offences across the sample. We see from Table 7.1 that a total of 6,522 instances of offences across all four types of offences were reported across the sample in the past year. We also see that 87% of these offences were concentrated amongst only 4.8% of cohort members who had committed offences on three or more occasions in the past year. Table 7.2 shows the concentration for criminal damage where we see that 86% of these offences were carried out by only 2.7% of cohort members. For shoplifting (Table 7.3) 77% of incidences were concentrated amongst only 1.9%. For neighbourhood crime (Table 7.4), 27% of offences were committed by only 0.1% of respondents. For cybercrime (Table 7.5), less than 1% were responsible for 75% of offences.

Table 7.1: Concentration of offending (criminal damage, shoplifting, neighbourhood crime, and cybercrime) in the last 12 months

Frequency of offences	Freq	Percent	Number of offences	Percentage of total offences
Never	8,722	88.6	0	0%
1-2 times	646	6.7	854	13.1%
3 or more times	475	4.8	5668	86.9%
Total	9,843	100.0	6522	100.0%

Table 7.2: Concentration of offending (criminal damage: graffiti, vandalism, fire setting) in the last 12 months

Frequency of offences	Freq	Percent	Number of offences	Percentage of total offences
Never	9,301	93.8	0	0%
1-2 times	346	3.5	463	14.0%
3 or more times	268	2.7	2854	86.0%
Total	9,915	100.0	3317	100.0%

Table 7.3: Concentration of offending (shoplifting) in the last 12 months

Frequency of offences	Freq	Percent	Number of offences	Percentage of total offences
Never	9,392	94.2	0	0%
1-2 times	395	4.0	520	22.6%
3 or more times	184	1.9	1784	77.4%
Total	9,971	100.0	2304	100.0%

Table 7.4: Concentration of offending (neighbourhood crime: breaking and entering, vehicle theft) in the last 12 months

Frequency of offences	Freq	Percent	Number of offences	Percentage of total offences
Never	9,746	98.2	0	0%
1-2 times	173	1.7	180	71.4%
3 or more times	10	0.1	72	28.6%
Total	9,929	100.0	252	100.0%

Table 7.5: Concentration of offending (cybercrime: hacking, virus/malware) in the last 12 months

Frequency of offences	Freq	Percent	Number of offences	Percentage of total offences
Never	9,738	97.9	0	0%
1-2 times	146	1.5	194	25.2%
3 or more times	65	0.7	575	74.8%
Total	9,949	100.0	769	100.0%

7.2 Prolific offending across various offences

In the following, the overall frequency across all four types of offences is used (criminal damage, shoplifting, neighbourhood crime, and cybercrime). Offending frequencies are grouped as shown in Table 7.6. The majority of cohort members (84%) had never participated in any of the activities in the past year, 6.4% reported offending on 1-2 occasions, 3.9% had offended 3-9 times, and 5.6% had engaged 10 or more times.

Table 7.6: Age 17 frequency of offences in the last year (criminal damage, shoplifting, neighbourhood crime, and cybercrime)

Never	84.10%
1-2 times	6.40%
3-9 times	3.90%
10 or more times	5.60%

In terms of the overlap between prolific offending and carrying or using a weapon at age 17, this is shown in Table 7.7. Those who had carried or used a weapon were much more likely to be a prolific offender, with 35.6% reporting having offended ten or more times in the past year, compared to only 3.5% of those who had not carried or used a weapon.

Table 7.7: Age 17 frequency of offences in the last year by weapon carrying or use

	Age 17	
Frequency of criminal damage, shoplifting, neighbourhood crime, and cybercrime in past year	**Weapon carrying or use**	**No weapon carrying or use**
Never	38.6%	87.2%
1-2 times	10.8%	6.1%
3-9 times	15.0%	3.1%
10 or more times	35.6%	3.5%

7.3 Multivariate prediction of prolific offending at age 17

Finally prolific offending at age 17 is examined in multivariate prediction models using multinomial logistic regression. The category of interest is the group of cohort members who have engaged in offending on 10 or more occasions in the past year, which can be classified as the most prolific offenders. This group is the reference category, enabling examination of factors that may distinguish them from those who have never participated in any offences, and those who have reported offending 1-2 times and 3-9 times. Results are shown in three models. In Model 1 individual characteristics and predictors from birth to age 11 are included, in Model 2 age 14 experiences and behaviours are added, short of offending behaviours at age 14 which are added in Model 3.

Results are presented in Table 7.8 where coefficients are risk ratios. Because the reference category is the most prolific offenders (10 or more times), the risk ratios here is the risk in the other categories, respectively, to the risk in the prolific category. Many risk ratios coefficients are therefore below one, which means that the variable is a risk factor for prolific offending, and the closer to zero the higher the magnitude of the risk factor. Coefficients above indicate that the variable is a protective factor, so associated with a lower likelihood of being a prolific offender.

Model 3 shows that in comparison to those who have never engaged in offences, prolific offenders were more likely to be male, but less likely to be of Bangladeshi or Pakistani origin than of White, and the same pattern is seen for most other ethnic minority groups although the associations were not statistically significant. Finally, we see that those who age 14 had engaged in offending activities were more likely to be prolific offenders at age 17, and the more types of activities that were reported (out of 10 possible), the higher the likelihood of prolific offending at age 17.

From the previous models (Model 1 and 2) we see that other variables were significantly associated with prolific offending. In Model 1 a high level of childhood externalising problems distinguished prolific offenders from those who had never offended, a relationship that appeared to be mediated by later experiences at age 14 in Model 2 (self-harm, own substance use, as well as peer substance), and these

age 14 associations then dissipated in Model 3, indicating that offending behaviours at age 14 were further mediators.

Finally, in terms of differences between prolific offenders and those who had engaged 1-2 times and 3-9 times (results shaded in a lighter colour), we see that very few factors distinguish these groups from prolific offenders. The only significant result was that taking part in multiple types of offending activities at age 14, differentiate prolific offenders from those who had participated 1-2 times at age 17. There were no significant variables that distinguished the most prolific offenders from those who reported offences on 3-9 occasions.

Table 7.8: Predictors of age 17 frequency of criminal damage, shoplifting, neighbourhood crime, and cybercrime in the last year

	Model 1			Model 2			Model 3		
	Ref is 10 or more times			Ref is 10 or more times			Ref is 10 or more times		
	Never RR	1-2 times RR	3-9 times RR	Never RR	1-2 times RR	3-9 times RR	Never RR	1-2 times RR	3-9 times RR
INDIVIDUAL CHARACTERISTICS									
Male	**0.54*** **	0.73+	0.89	**0.49*** **	0.82	0.92	**0.63** **	0.95	0.94
Oldest child in household	1.03	0.97	0.95	0.97	0.93	0.94	0.97	0.93	0.95
Cohort member age in months at age 17 survey	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.97	0.98
Ethnicity (ref. White)									
Mixed	0.82	1.27	0.67	0.77	1.22	0.66	0.82	1.25	0.66
Indian	1.95	1.06	1.00	1.38	0.88	0.95	1.54	0.94	0.96
Pakistani and Bangladeshi	**3.12** **	1.58	1.80	2.14+	1.34	1.75	**2.54***	1.49	1.78
Black or Black British	1.58	1.67	1.92	1.19	1.42	1.83	1.32	1.48	1.81
Other Ethnic group (incl. Chinese)	1.31	1.07	1.16	0.99	0.94	1.15	1.14	1.03	1.17
FAMILY SOCIOECONOMICS									
20% lowest	0.84	0.76	0.68	0.93	0.86	0.71	0.91	0.85	0.72
20-40%	0.78	0.74	0.55+	0.86	0.81	0.57+	0.83	0.79	0.57+
40-60%	0.93	0.85	0.91	0.97	0.88	0.93	0.93	0.87	0.93
60-80% highest	0.88	0.82	0.76	0.90	0.85	0.77	0.92	0.87	0.78
FAMILY ENVIRONMENT									
Breastfed	1.07	1.14	1.24	1.07	1.11	1.23	1.07	1.11	1.24
Mother smoked during pregnancy	0.92	0.94	0.96	1.04	1.00	0.98	1.04	1.00	0.99
Parent-child relationship (parent reported) age 3 [a]	0.93	0.97	0.99	0.95	0.99	0.99	0.95	0.99	0.99
Main parent mental health problems (9mths-11yrs) [a]	0.97	1.08	1.01	0.99	1.08	1.00	0.97	1.07	1.00
Domestic abuse between parents (9mths-11yrs)	0.86	0.91	1.11	0.92	0.95	1.13	0.94	0.96	1.12
Main parent used recreational drugs (age 3,5 or 14)	0.74	1.21	1.30	0.92	1.36	1.34	0.97	1.41	1.33
Ever single parent between 9mths and 11yrs	0.73+	0.70	0.97	0.83	0.76	0.99	0.85	0.77	0.99
CHILDHOOD MENTAL HEALTH									
Childhood externalising problems (age 3-11) [a]	**0.80***	0.90	1.02	0.91	0.98	1.04	0.93	0.99	1.04
Childhood internalising problems (age 3-11) [a]	1.08	0.99	0.94	1.02	0.96	0.92	1.01	0.95	0.92
ADOLESCENT MENTAL HEALTH									

Age 14: Self-harmed in past year		**0.66***	0.99	1.07	0.76	1.08	1.08
SUBSTANCE USE AT AGE 14							
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)							
One type of substance		**0.60***	0.70	0.92	0.79	0.84	0.96
Two or three types of substances		**0.41****	0.56	0.69	0.77	0.83	0.77
SOCIAL MEDIA AND GAMING AT AGE 14							
Age 14: Social media time use [b]		0.89	1.06	0.87	1.03	1.17	0.89
Age 14: Computer/electronic gaming time use [b]		0.77	0.62	0.80	0.82	0.64	0.79
SCHOOL FACTORS							
Five A to C GCSEs		1.09	1.09	1.04	1.12	1.11	1.04
School exclusion in secondary between age 11 and 14		0.89	0.97	1.20	1.02	1.03	1.20
Persistent truancy (more than just the once) past year at age 14		0.69	0.68	1.05	0.96	0.83	1.12
PEER FACTORS AT AGE 14							
Age 14: Spending time with friends in leisure time on most days		0.84	0.81	0.97	0.86	0.83	0.97
Age 14: Victim of peer bullying		0.91	1.10	1.03	1.05	1.19	1.03
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)							
One type of substance		0.87	1.07	1.14	0.95	1.12	1.13
Two or three types of substances		**0.60***	0.94	1.07	0.75	1.07	1.08
OFFENDING BEHAVIOURS AT AGE 14							
Number of offending activities out of 10 possible (ref none)							
One					**0.51*****	0.74	1.05
Two					**0.23*****	**0.46***	1.03
Three or more					**0.13*****	**0.30****	0.75

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10
Confidence intervals are not shown due to lack of space.
[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

8 Discussion and Conclusion

Summary of findings

This report examined offending behaviours at age 17 using nationally representative longitudinal data from the UK Millennium Cohort Study. The focus was on carrying or using a weapon in the last year, but also other types of offences were studied.

The first aim was to examine correlates of carrying or using a weapon at age 17. Whilst many single factors were correlated with this outcome, fewer associations were identified when controlling for other variables. Significant risk factors in the controlled models included: being male, use of substances at age 14, spending a lot of time on computer/electronic gaming at age 14, being excluded from school between age 11 and 14, and having peers who use multiple substance at age 14. Results also suggested that these age 14 experiences and behaviours appeared to be mediators between childhood experiences (low household income, domestic abuse between parents, externalising problems, and self-harm in adolescence) and carrying or using a weapon at age 17.

The second aim was to estimate the prevalence of various offending behaviours at ages 14 and 17 and to examine factors related to change between these ages. There was an increase in the prevalence of carrying a weapon, using of weapon, shoplifting, theft from person, graffiti, and vandalism. There was no change for breaking and entering, computer hacking, or sending of virus/malware/spyware. Only assault had decreased between the two ages. Persistent offending across ages within the same type of offence was rare, but for assault slightly more common. Factors associated with persistent offending across all types of offences were: being male, self-harm at age 14, substance use at age 14, truancy between age 11 and 14, and peer substance use at age 14. Many factors that were associated with persistent offending were also related to offending at age 14 only.

The final aim was to establish the concentration of offending, and to examine prevalence and predictors of prolific offending at age 17. Offending was concentrated amongst a very small groups of individuals. Those reporting carrying or using a

weapon at age 17 were much more likely to be a prolific offender. Having engaged in many different types of offences previously at age 14 was highly predictive of prolific offending at age 17. Being male was an additional risk factor, however there was indication that some ethnic groups had a lower risk.

Discussion of findings

Sex

We found a higher male prevalence for carrying or using a weapon and other offences at age 17, and males were also more likely to be persistent offenders between age 14 and 17, and to offend prolifically. The sex differences in offending identified in our analyses have been shown consistently in numerous previous studies [20], and reflected in official statistics, although in the criminal justice system the gender gap is even wider with males accounting for around 85% of arrests and 75% of convictions [21] This suggests that biological sex is an important driver in offending and supportive of evolutionary approaches to understanding crime. [22] However, research and official offending statistics have also shown that there has been a narrowing of the gender gap in crime over time.[23] [24] This indicates that social aspects of gender also play a role, and women's liberation and movement towards equality has likely meant that differences in many social behaviours have also narrowed. In terms of risk factors for carrying or using a weapon, we found these to be similar for males and females. Some previous research has shown gender differences in risk factors for offending, for example in the Cambridge Study socioeconomic risks which were found to predict offending more strongly for females than for males. [25] However, in a recent summary of evidence, it was concluded that no risk factor is a significant predictor for just one gender, but some factors can be slightly more predictive for one gender.[26] The uniformity of risk factors for males and females is important for prevention and intervention, suggesting that gender-specific programmes in terms of targeting risks are not necessarily required. However there may still be a need for different approaches in relation to engagement and implementation.

Ethnicity

In terms of ethnicity, we found no evidence of ethnic minority groups reporting higher rates of carrying or using a weapon than those of white origin. If anything, there was some indication that some ethnic minority groups had a lower rate, and those of Bangladeshi and Pakistani origin were less likely to be classified as prolifically offenders across several types of offences. These findings are slightly at odds with official statistics, which show an overrepresentation of these ethnic minority groups in the criminal justice system.[27] However, other research studies have reported similar or lower rates of self-reported offending in ethnic minority groups, whilst official crime rates show the contrary, and furthermore this contradiction is not just limited to a UK context. [28] Bias in the criminal justice system against ethnic minorities has been highlighted as a possible explanation.[29] It is the plan to link the Police National Computer (PNC) data to the MCS. The PNC stores criminal records information across the UK, and this linkage will enable further research on criminal convictions in the MCS and ethnic disparities, whilst drawing on other information in this rich longitudinal dataset. Ethnicity in relation to offending is a very complex matter and it seems that different patterns exist for different types of offences as we show in our additional analyses (Appendix E). It is clear it is not useful to consider all ethnic groups under a combined Black, Asian and minority ethnic (BAME) heading as there is much heterogeneity between these groups. For many offences, those from an Asian background tended to have lower rates of offending than those of Mixed or Black origin.

Family socioeconomics and family environment

Poverty and low socioeconomic status during childhood are well-established risk factors for subsequent development of antisocial and criminal behaviour.[30] Our results were consistent with this pattern by showing a correlation between low childhood household income and carrying or using a weapon. However, this relationship dissipated when including other psychosocial aspects of the family environment, indicating that it is through these more proximal family mechanisms that socioeconomic status influences adolescent offending. Previous research has provided support for a reciprocal relationship between socioeconomic status and family processes, i.e., these mutually affect each other.[31] In terms of implications for

policy, strategies that directly address low income whilst also target the family environment in which the child and adolescent develop, are both needed. I our analyses, a significant family risk factor for carrying or using a weapon was domestic abuse between parents, which has been identified also in many previous studies as detrimental to child developmental outcomes such as conduct problems,[32] and later violence.[33] Early identification of domestic abuse and violence in families, and provision for evidence-based interventions that reduce this, may therefore be an especially effective approach for reducing serious violence later in adolescence and beyond.

Mental health

Our analysis showed that a high level of externalising symptoms (conduct problems and hyperactivity) in childhood was related to carrying or using a weapon at age 17, and this association was mediated through a range of more proximal experiences and behaviours at age 14. We also found that self-harm at age 14 was significantly related to carrying or using a weapon at age 17, again mediated by other age 14 behaviours, mainly offending behaviours, which then predicted weapon carrying or use at age 17. In addition, self-harm was associated with persistent offending at age 14 and 17. Whilst the link to externalising problems, or conduct problems as they are also commonly referred to, is well-established,[34] [35] the association with emotional problems such as self-harm has been less well researched. However, a previous study using the MCS examined this and found that a high level of depressive symptoms at age 14 was related to a high level of concurrent antisocial behaviour.[36] Furthermore, this study examined the same relationship in a cohort of 14-year-olds ten years previously, using the Avon Longitudinal Study of Parents and Children (ALSPAC), and found that the relationship between depressive symptoms and antisocial behaviour was stronger in the younger MCS cohort. This study also found that rates of antisocial behaviour had reduced in the younger cohort, but these behaviours had become more concentrated in those with mental health difficulties. Our findings also suggest that mental health may be an important avenue for intervention that may help reduce weapon carrying or use in young people. A focus on mental health in young people is especially salient in the context of the COVID-19 pandemic as research has indicated that young people have been more negatively

affected in terms of their mental health, [37] [38] and although there is only weak evidence of a pandemic related increase in self-harm in the population generally,[39] it is likely that young people as a subgroup are affected as is the case for mental health. During the initial stages of the UK lockdown there was a decrease especially in young people presenting themselves to health services with self-harm,[40] although generally there has been a decrease in health seeking behaviour during the pandemic, so this pattern is not unique to self-harm. There is a risk that delay in treatment for self-harm is storing up issues for the future.

Substance use

Cohort members use of substances had a close link with carrying or using a weapon at age 17, and with persistence of this behaviour and other offences between age 14 and 17. The pattern showed that use of multiple substances (binge drinking, regular smoking, trying cannabis/drugs) was especially strongly linked to offending. The association between substance use and offending is consistent with previous research and extremely well established in the literature [41], including examination of the current sample at age 14.[28] Mental health tends to be related to substance use,[42] also previously shown in the current MCS sample [28], and may be a driver of the association between substance use and offending. However, the association with substance use in our examinations remained after controlling for childhood and adolescent mental health.

In addition to own substance use, peer substance use was associated with carrying or using a weapon at age 17 and with persistent offending. The importance of peers has also been demonstrated in a wealth of previous research.[43] However, the extent to which it reflects the direct influence of peers vis a vis selection effects, whereby adolescents chose peers with similar interests, attitudes and behaviours (also referred to as homophily), is unclear. However previous studies tend to show that most peer effects are due to selection. [44] [45] In our study, whilst the association between own substance use and weapon carrying or use was reduced somewhat when peer substance use was controlled for, both remained significantly associated with this outcome. In terms of policy implications, targeting substance use in adolescents may be an important element to help reduce weapon carrying and use

and other offences. Whilst some interventions are targeted at the individual, others focus specifically on resistance to peer pressure, with evidence of effectiveness.[46] It is interesting to note that there is evidence of a downward trend in the use of substances amongst young people over the last two decreased, [47] [48] [49] whilst youth offending has also been seen to decline over this period.[50] Further research is needed to examine the extent to which there may be a causal relationship.

School exclusion

We found that being excluded from school on a temporary or permanent basis between the age of 11 and 14 was related to carrying or using a weapon at age 17. Whilst previous examinations using UK data have shown a link, including analyses of the current MCS sample at age 14, these designs are less causally sound. Our current analyses are of longitudinal associations, whilst controlling for potentially confounding effects of individual and family background factors, childhood externalising problems, as well as other experiences and behaviours at age 14, and therefore we get closer to causal estimates than previous UK studies on exclusion. [51] [52] This is an important finding and indicates that the practice of school exclusion, used in most educational practices to deal with disruptive and antisocial behaviours, may in fact be perpetuating or escalating these behaviours. We showed that a low level of school connectedness already in primary school was correlated with carrying or using a weapon at age 17. Findings highlight the importance of early intervention to prevent school exclusion.

Gaming

Our finding that spending a lot of time on computer/electronic gaming at age 14 was associated with carrying or using a weapon at age 17 warrants discussion. Previous studies have been mixed regarding the association between gaming and aggression. In a recent systematic review of 28 longitudinal studies, a significant but very small association was found, and authors concluded that it did not support a longitudinal relationship between gaming and youth aggressive behaviours.[53] Moreover, the nature of games played is likely relevant, but is not observed in our data. It is possible that aggression and violence, which feature in some video games, affects those who play, for example a study has shown that playing violent video games is

correlated with being less affected by distressing images.[54] However, it is also plausible that those who play violent games excessively are a selective group with preferences which also make them more likely to engage in offending behaviours. It is also worth noting the countervailing argument, with some suggesting that the computer and internet revolution has led to young people spending an increasing amount of time at home, and that this has been a driver for a decrease in youth offending rates.[55] This is an area for future research, given large increases in gaming in recent years.[56]

Previous offending at age 14

Although persistent offending (engagement at both age 14 and 17) was shown to be quite rare for carrying or using a weapon and most other offences, carrying or using a weapon previously at age 14 was highly predictive of continued engagement at age 17 (around a third had already done this at age 14), as was previous engagement in other types of offences. Reporting participation in many different types of activities at age 14 was also predictive of prolific offending at age 17. Early onset of offending has in the criminological literature been shown to be one of the strongest predictors of long-term offending.[57] Explanations are likely to include that the individual is carrying the same criminogenic risks across time, and that early onset is a proxy for many other influential factors for child and adolescent development, which in turn affect offending behaviours. [58] In terms of policy, this suggests that early prevention and intervention that directly target the risk factors for carrying or using a weapon and other offences are needed.

Change in prevalence of offending between age 14 and 17

We found that most offending behaviours examined (including carrying and using a weapon) tended to increase in prevalence between age 14 (3.7%) and 17 (6.4%), which is consistent with the well-established crime-age curve. Rates are relatively low in childhood, then increase dramatically from early adolescence, with a peak in middle to late adolescence, before declining steeply in very late teens to early twenties, followed by a more steady decline through adulthood.[59] The age crime curve has been shown to be different for self-reported studies (showing an earlier peak) compared to official statistics (showing a later peak).[60]

Our results differed from previous UK self-reported studies which have shown a decline rather than an increase in most offending behaviours between early and late adolescence. For some studies we are able to directly compare as the question regarding carrying a weapon in the past year (but not weapon use) was administered at age 14 and 17 across studies. In our analyses, the prevalence of carrying a weapon was 3.1% at age 14 and 5.7% at age 17. In the ALSPAC study, a cohort study of English people ten years older than the MCS, the prevalence of carrying a weapon was 4.9% at age 14, declining to 1.9% at age 17. [61] In the Offending, Crime and Justice Survey (OCJS) 2003-2006,[62] the prevalence of carrying a knife remained at 6% at age 14/15 and at age 16/17.[63] In the Peterborough Adolescent Study (PADS), born approximately 10 years before the MCS, the prevalence of carrying a weapon at age 14 was 8.8% and 4.4% at age 17.[ii] Results from these earlier studies, measured at the same age as the MCS but around 10 years earlier, therefore suggest largely a decline in weapon carrying between age 14 and 17, characterised by a somewhat higher prevalence at age 14 than in the MCS, which then drops to a prevalence lower than or similar to the MCS at age 17. These previous studies therefore seem to indicate an earlier onset and an earlier peak than that found in the MCS. For other offences where measures are comparable, we see a similar pattern.[iii]

The current MCS study dealt with attrition and missing data by using multiple imputations, invoking reasonable assumptions to impute data where missing, which we found was disproportionately among those who reported antisocial behaviours previously at age 11 and age 14. We believe these imputation methods provide more accurate estimates of offending, and the increase we measured between age 14 and 17 is more in line with official statistics. Unimputed figures for carrying a weapon in the MCS were 3.5% at age 14 and 2.9% age 17 MCS, so a very slight decrease and more in line with previous self-report studies. This suggests that the methodological approach used in the current study of imputing data for those who had attritted from the study may account for differences compared to previous self-report studies.

[ii] Figures are obtained through private correspondence with the researchers on the Peterborough Adolescent Development Study and we are very thankful for their assistance with producing these analyses.

[iii] E.g. vandalism: MCS: 3.9% (age 14) 5.6% (age 17); ALSPAC: 6.1% (age 14), 3.7% (age 17.5). PADS: 17.5% (age 14), 10.7% (age 17)

Whilst our rates at age 14 are still low compared to previous studies, it can be difficult to directly compare results between studies: samples differ in their characteristics and geographic coverage, and some studies are more affected by selective attrition, which is then dealt with differently in analyses. Indeed the fact that different prevalences are reported across previous studies that were all conducted at a similar time period, further demonstrates the issue around making comparisons. How current generations of young people compare to previous ones in terms of carrying or using a weapon and other offending behaviours warrants further research. There may be scope for harmonising analytical approaches using data from past and present studies.

Strengths and limitations of study

Strengths of this study included the large sample of cohort members representing the whole of the UK. The longitudinal design, with follow-ups from birth and at developmentally important timepoints through childhood, provided a rich set of variables to examine as predictors of offending and to include as controls. The use of multiple imputations provided more accurate estimates of prevalences and the age-crime curve than in other in other similar studies.

However, it is important to also outline some of the limitations of this study. Some offending categories were small, which limits power to predict, and in combination with predictors where categories sometimes were also small, this further reduces power. Further, it was not always possible to impute missing data in the desired format e.g., exact frequencies, and instead only categorical variables were imputable. Although care was taken to use predictor variables previous to the outcomes at age 17, providing a more causally sounds design than using concurrent predictors, we nevertheless cannot claim that factors identified as being related to carrying or using a weapon or other offending outcomes have a causal effect.

Conclusion

This report provided a thorough examination of weapon carrying or use at age 17 which was seen to have increased markedly in prevalence since age 14. Carrying or using a weapon at age 17 had a strong concurrent overlap with various other

offences so a focus on prevention and intervention for this type of offending is likely to reduce offending also more generally. This study showed that factors associated with carrying or using a weapon were multiple, which suggests a need for multiple strategies that target these core areas. Strategies in childhood should target low family income, domestic abuse between parents, and child conduct problems. In adolescence, the focus should be on adolescent mental health, substance use, peer substance use, and school exclusion. Early prevention in childhood may reduce the need for later intervention, as risk factors identified in childhood seem to be linked to weapon carrying or use through increasing the risk factors later in adolescence.

9 Appendices

Appendix A: Measurement of offending behaviours

Survey questions related to offending behaviours at age 14 and 17

	Age 14 question wording	Age 17 question wording
Property offences		
Public nuisance	In the last 12 months have you been noisy or rude in a public place so that people complained or got you into trouble?[1 3]	NA
Graffiti	In the last 12 months have you written things or spray painted on a building, fence or train or anywhere else where you shouldn't have? [1 3]	In the last 12 months have you written things or spray painted on a building, fence or train or anywhere else where you shouldn't have? [1 3]
Vandalism	In the last 12 months have you on purpose damaged anything in a public place that didn't belong to you, for example by burning, smashing or breaking things like cars, bus shelters and rubbish bins?[1 3]	In the last 12 months have you deliberately damaged something in a public place that didn't belong to you, for example by burning, smashing or breaking things like cars, bus shelters and rubbish bins? [1 3]
Shoplifting	In the last 12 months have you taken something from a shop without paying for it?[1 3]	In the last 12 months have you taken something from a shop without paying for it? [1 3]
Theft from person	In the last 12 months have you stolen something from someone. e.g. a mobile phone, money etc.? [1]	In the last 12 months have you stolen something from someone. e.g. a mobile phone, money etc.? [1]
Breaking and entering	Have you ever gone into someone's home without their permission because you wanted to steal or damage something? [1]	In the last 12 months have you gone into someone's home without their permission because you wanted to steal or damage something? [1 3]
Vehicle theft	NA	In the last 12 months have you Stolen a vehicle that didn't belong to you? [3]
Fire setting	NA	In the last 12 months have you Deliberately set fire to something that you shouldn't have? [1 3 4]
Offences against person		
Assault	In the last 12 months have you pushed or shoved/hit/slapped/punched someone? [1]	In the last 12 months have you pushed or shoved/hit/slapped/punched someone? [1]
Use of weapon	In the last 12 months have you used or hit someone with a weapon? [1]	In the last 12 months have you hit someone with or used a weapon? [1]
Carrying a weapon	Have you ever carried a knife or other weapon for your own protection because someone else asked you to or in case you get into a fight? [1]	In the last 12 months have you carried a knife or other weapon? For your own protection, because someone else asked you to or in case you get into a fight.[2]
Gang membership	Are you a member of a street gang? (By a street gang, we mean groups of young people who hang around together and: have a specific area or territory; have a name, a colour or something else to identify the group; possibly have rules or a leader; who may commit crimes together.) [1]	Are you a member of a street gang? (A street gang is a group of young people who hang around together and: have a specific area or territory; have a name, a colour or something else to identify the group; possibly have rules or a leader; who may commit crimes together.) [2]
Cyber and online		

Hacking	In the last 12 months have you accessed, or hacked into, someone else's computer, e-mail or social networking account without their permission? [1 3]	In the last 12 months have you accessed, or hacked into, someone else's internet-enabled device (e.g. computer, tablet, mobile phone, games console), e-mail or social networking account without their permission? [1 3]
Send virus, spyware or malware	In the last 12 months have you used the internet to send viruses, or other harmful software, to deliberately damage or infect other computers? [1 3]	In the last 12 months have you used the internet to send viruses, spyware or other harmful software/malware, to deliberately damage or infect other computers? [1 3]
Online harassment	NA	In the last 12 months have you harassed or bothered someone via mobile phone or email? [1]
Online bullying	NA	In the last 12 months have you sent pictures or spread rumours about someone via phone, email, social media or online? [1]
Police contact		
Stopped by police	Have you ever been stopped and questioned by the police? [1]	Have you ever been stopped and questioned by the police? [2]
Cautioned by police	Have you ever been given a formal warning or caution by a police officer? [1]	Have you ever been given a formal warning or caution by a police officer? [2]
Arrested	Have you ever been arrested by a police officer and taken to a police station? [1]	Have you ever been arrested by a police officer and taken to a police station? [2]

Notes
[1] Self-completion questionnaire completed during interview visit
[2] Online questionnaire (CAWI) completed during or after interview visit.
[3] Has follow up question on number of times (frequency) in the past year
[4] Has follow up question on what was set fire to (car or other vehicle; my house; someone else's house; outbuilding or shed; other building; loose rubbish, bin or skip; chemicals or solvents; tree, grass or leaves; other)
NA= Not Available

Appendix B: Measurement of predictor variables

INDIVIDUAL CHARACTERISTICS	**Sex at birth**: Reported by the main parent in the initial survey **Age at age 17:** Cohort member's age in months at the date of the interview, derived from interview date and birthdate of the cohort member. **Oldest child in household:** Derived a household questionnaire with the main parent collecting information on age, sex, and relationship of household members to the cohort member. **Ethnicity**: Ethnicity of the cohort member. Originally reported by the main parent in the initial survey using 16 categories. The variables used in the current study is a condensed version using 6 categories.
SOCIOECONOMIC BACKGROUND	**Household income weekly (average 9 months to age 11)**: Household income was reported by the main parent shown a card with weekly, monthly, and annual bands of income. Based on these bands a continuous income measure was estimated using relevant predictor variables. Finally, income was equivalised using modified OECD scales, which takes account of the household size and composition, thereby factoring in the needs of the family. Further information is available elsewhere.[18] **Free school meals at age 5 or 7:** The main parent reported on whether they received free school meals. This information was obtained both at age 5 and at age 7. The variable used in this study is whether they received free school meals either at age 5 or at age 7. **Highest education in household:** Both the main parent and their partner (if applicable), reported their training and education in the initial survey sweep. These were categorised according to the National Vocational Qualification (NVQ, level 1-5). NVQ1=Three to four GCSEs at grades D-E, NVQ2=Four or five GCSEs at grades A*-C, NVQ3= Two or more A-levels, NVQ4=Degree, NVQ5=Master's degree or above. The highest level of education on the parents was used in the current study.

	Housing type age 11: The main parent reported on the housing situation of the family using ten categories ranging from 'owns outright' to 'squatting'. The variable used in the current study is a dichotomised version distinguishing between those who owns outright or with a mortgage and those who rent.
EARLY CHILDHOOD ENVIRONMENT	**Breastfed ever:** The main parent reported in the initial survey whether the child had ever been breastfed. **Mother smoked during pregnancy after second month:** The main parent (predominately the mother) reported their smoking habits prior to and during the pregnancy, including month of cessation (if the mother's partner completed the main parent interview, then they reported on the mother's smoking during pregnancy. Smoking during pregnancy was defined as smoking after the second month of pregnancy. Anyone giving up before then were classified as not smoking during pregnancy. **Age 3: Safety of home environment (observed):** The safety of the home environment was assessed by the interviewer during the home visit at child age 3. These were five items from the Home Observation Measurement of the Environment (HOME) [64]. 'Child's in-home play environment is safe? E.g., without things such as uncovered rotary fan, boards with nails sticking out, pot handles sticking over the stove, exposed electrical outlets, falling plaster, peeling paint, rodents, poisons and cleaning materials).' 'All visible rooms of house/flat are reasonably uncluttered', 'The interior of the home is dark or perceptually monotonous', 'All visible rooms of house/apartment are reasonably clean', 'Parent kept child in visual range when the child was not cared for by someone else (looked often at him/her)'. **Age 3: Positive parenting (observed**): Parent-child interaction was observed by the interviewer during the age 3 assessment. Eight items captured the parents positive and negative interaction with the child (Mother's voice positive when speaking to child; Mother converses at least twice with child; Mother answers child's questions verbally; Mother praises child spontaneously; Mother caresses or kisses child Mother scolded child more than once; Mother used physical restraint on child; Mother slapped or spanked child [yes/no])

	Negative items were reverse coded before adding up the total score for overall positive parenting. **Age 3: Parent-child relationship (parent reported)** Parent completed the Pianta Child-Parent Relationship Scale, 15-item short form which measures both parent-child closeness and parent-child conflict. [65]
FAMILY RISKS	**Main parent mental health problems (9mths-11yrs)** The main respondent completed the Malaise[66] in the initial birth sweep and in subsequent sweeps at age 3, 5, 7, and 11 the Kessler[67] was used to assess mental health. A composite measure was then created combining parental mental health across childhood. **Domestic abuse between parents (9mths-11yrs)** In all five sweeps from birth to age 11, the main respondent and the partner (where available), were asked: 'People often use force in a relationship - grabbing, pushing, shaking, hitting, kicking etc. Has your partner ever used force on you for any reason? [yes/no] If either party responded yes at any sweep this was counted as domestic abuse. **Main parent frequent drinker - age 9mths to 11yrs** The main respondent reported weekly drinking frequency at each sweep from birth to age 11 through the question: 'Which of these best describes how often you usually drink alcohol?' (Every day, 5-6 times per week, 3-4 times per week, 1-2 times per week, 1-2 times per month, Less than once a month, Never). Drinking 5 or more times a week was considered frequent. **Main parent used recreational drugs age 3,5, or 14** The main parent reporting use of recreational drugs at age 3, 5 and 14 through the question: 'As you know many people have experimented with drugs at some time. During the past year have you used any recreational drugs like cannabis, cocaine or

	ecstasy?' (Occasionally, Regularly, Never). Occasional or regular use was counted as having used recreational drugs) **Death of a parent or sibling** In each the main respondent completed a survey of who lived in the household and the relationship to the cohort member. This tracked any new additions as well as departures from the household. From age 7 the question was included why anyone who had left did not live there anymore. **Main parent spent time in care as a child** The main respondent was asked in the birth sweep: 'Before the age of 17 did you spend any time living away from both of your parents?' (yes/no) **Age 11: Bullied by sibling** Self-reported by cohort members through question: 'How often do your brothers or sisters hurt you or pick on you on purpose?' (Most days, Once a week, Once a month, Every few months, Less often, Never) **Ever a single parent between 9mths and 11yrs** The household survey recorded who lived in the household and their relationship to the main respondent. If the main respondent in any sweep between the birth sweep to age 11 reported no partner living with them this was considered a single parent. **Age 11: Number of siblings** The number of siblings of the cohort member living in the household was recorded as part of the household survey completed by the main respondent.
SCHOOL FACTORS	**School connectedness age 7 and 11** Reported by cohort members at age 7 using items: 'How much do you like school?' (I like it a lot, I like it a bit, I don't like it), 'How often do you try to do your best at school?', 'How often is school interesting?', 'How often do you feel unhappy at school?', 'How often do you get tired at school?', 'How often do

	you get fed up at school?' (All of the time, Some of the time, Never). Reported by cohort members at age 11 using items: At age 11 items were: 'How often do you try your best at school?', 'How often do you find school interesting?', 'How often do you feel unhappy at school?', 'How often do you get tired at school?', 'How often do you feel school is a waste of time?' (All of the time, Most of the time, Some of the time, Never) **Academic interest age 11** Self-reported by cohort members in three items: How much do you like English?, How much do you like Maths?, How much do you like Science? (A lot, A little, Not at all) **Academic self-concept age 11** Self-reported by cohort members through the questions: I am good at English, I am good at maths, I am good at science (Strongly disagree, Disagree, Agree, Strongly agree) **Five or more A*-C GCSEs** Cohort members self-reported their GCSE results at age 17 **School exclusion in secondary between age 11 and 14** Parents reported both at age 11 and at age 14: 'Has [cohort member's name] ever been temporarily suspended or temporarily excluded from school for at least one day?' (yes, no) **Persistent truancy (more than just the once) past year at age 14** Self-reported at age 14 by asking cohort members: 'In the last 12 months, how often did you miss school without your parents' permission (even if only for half a day or a single lesson)? (Most days, 2-3 times a week, Once a week, Once a month, Less than once a month, Once)
PEER FACTORS	**Age 7: Number of friends**

Self-reported by cohort member in question: How many friends do you have? (Lots, Some, Not Many)

Age 14: Time spent with friends in leisure time

In the afternoon after school, how often do you spend time with your friends, but without adults or older children, doing things like playing in the park, going to the shops or just 'hanging out'? (Most days, At least once a week, At least once a month, Less often than once a month, Never)

Age 14: Victim of peer bullying

How often do other children hurt you or pick on you on purpose? (Most days, Once a week, Once a month, Every few months, Less often, Never)
(A binary measure was created for the regression analyses: No=Never, Yes= Most days, Once a week, Once a month, Every few months, Less often)

Age 11: Conflict with friends

Self-reported by cohort members through one question:

'How often do you argue or fall out with your friends?'

(Most days, At least once a week, At least once a month, Less often than once a month, Never)

Peer substance use:

<u>Age 14: Friends smoke cigarettes</u>

How many of your friends smoke cigarettes? Do not include electronic cigarettes (e-cigarettes). (None of them, Some of them, Most of them, All of them)
(Binary measure created for correlational analyses: No=Never, Yes=Some, most, or all of them)

<u>Age 14: Friends drink alcohol</u>

How many of your friends drink alcohol? (None of them, Some of them, Most of them, All of them)
(Binary measure created for correlational analyses: No=Never, Yes=Some, most, or all of them)

	Age 14: Friends take drugs Do any of your friends take cannabis (weed) or any other illegal drugs? (None of them, Some of them, Most of them, All of them) (Binary measure created for correlational analyses: No=Never, Yes=Some, most, or all of them) For regressions a single measure of peer substance use was created: None, One type of substance, Two or three types of substances
AREA AND REGION	**Age 11: Safety of area** Self-reported by cohort members using a single item: How safe is it to walk, play or hang out in this area during the day? (Very safe Safe, Not very safe, Not at all safe) **UK Country** Survey administrative information **Region in England** Survey administrative information
CHILD AND ADOLESCENT MENTAL HEALTH	**Childhood externalising problems (age 3-11):** Measured through parent-reports using 10 items from the Strengths and Difficulties Questionnaire (SDQ).[68] Five items relate to conduct problems (Often has temper tantrums or hot tempers; Generally obedient, usually does what adults request; Often fights with other children or bullies them; Often lies or cheats; Steals from home, school or elsewhere.). Five items are on hyperactivity (Restless, overactive, cannot stay still for long; Constantly fidgeting or squirming; Easily distracted, concentration wanders; Thinks things out before acting; Sees tasks through to the end, good attention span). **Childhood internalising problems (age 3-11):** Measured through parent-reports using 10 items from the Strengths and Difficulties Questionnaire (SDQ).[67]

	Five items assess emotional problems (Often complains of headaches, stomach-aches or sickness; Many worries, often seems worried; Often unhappy, down-hearted or tearful; Nervous or clingy in new situations, easily loses confidence; Many fears, easily scared). Five items measure peer problems (Rather solitary, tends to play alone; Has at least one good friend; Generally liked by other children; Picked on or bullied by other children; Gets on better with adults than with other children). **Age 14: Self-harm in past year:** Measured in a single question (In the past year have you hurt yourself on purpose in any way?)
LEISURE ACTIVITIES	**Age 14: Social media time use per weekday** On a normal week day during term time, how many hours do you spend on social networking or messaging sites or Apps on the internet such as Facebook, Twitter and WhatsApp? (None, Less than half an hour, Half an hour to less than 1 hour, 1 hour to less than 2 hours, 2 hours to less than 3 hours, 3 hours to less than 5 hours, 5 hours to less than 7 hours, 7 hours or more) The categorical variable was transformed into ridit scores for use in regressions.[69] **Age 14: Computer/electronic gaming time use per weekday** On a normal week day during term time, how many hours do you spend playing electronic games on a computer or games systems, such as Wii, Nintendo D-S, X-Box or PlayStation? Please remember to include time before school as well as time after school. (None, Less than half an hour, Half an hour to less than 1 hour, 1 hour to less than 2 hours, 2 hours to less than 3 hours, 3 hours to less than 5 hours, 5 hours to less than 7 hours, 7 hours or more). The categorical variable was transformed into ridit scores for use in regressions.[68] **Age 14: Organised activities (youth clubs/scouts/girl guides or other)**

	How often do you do the following activities when you are not at school? Go to youth clubs, scouts, girl guides or other organised activities? (Most days, At least once a week, At least once a month, Several times a year, Once a year or less, Never or almost never).
SUBSTANCE USE AT AGE 14	**Substance use** Binge drinking in past year: How many times have you had five or more alcoholic drinks at a time in the last 12 months? Regular smoker: 'I usually smoke between one and six cigarettes a week.' 'I usually smoke more than six cigarettes a week.' Tried cannabis ever: Have you ever tried cannabis (also known as weed, marijuana, dope, hash or skunk)? Tried hard drugs ever: Have you ever tried any other illegal drug (such as ecstasy, cocaine, speed)? For regressions a single measure of substance use was created: (None, One type of substance, Two or three types of substances) For this single measure cannabis and drugs were here combined as 'drugs', the other types were binge drinking and regular smoking)
OFFENCES AT AGE 14	**Weapon carrying/use:** In the last 12 months have you used or hit someone with a weapon? Have you ever carried a knife or other weapon for your own protection because someone else asked you to or in case you get into a fight? [yes/no] **Assault:** In the last 12 months have you pushed or shoved/hit/slapped/punched someone? [yes/no] **Shoplifting:** In the last 12 months have you taken something from a shop without paying for it? [yes/no] **Neighbourhood crime (theft from person, breaking and entering)**: In the last 12 months have you stolen something from someone. e.g. a mobile phone, money etc.? Have you

ever gone into someone's home without their permission because you wanted to steal or damage something? [yes/no]

Criminal damage (graffiti, vandalism): In the last 12 months have you written things or spray painted on a building, fence or train or anywhere else where you shouldn't have? In the last 12 months have you on purpose damaged anything in a public place that didn't belong to you, for example by burning, smashing or breaking things like cars, bus shelters and rubbish bins? [yes/no]

Cybercrime (hacking, sent virus/malware/spyware): In the last 12 months have you accessed, or hacked into, someone else's computer, e-mail or social networking account without their permission? In the last 12 months have you used the internet to send viruses, or other harmful software, to deliberately damage or infect other computers? [yes/no]

Total number of offending types (out of 6 possible: weapon carrying/use, assault, shoplifting, neighbourhood crime, criminal damage, cybercrime) [0-6]

Ever a gang member: Are you a member of a street gang?

By a street gang, we mean groups of young people who hang around together and: have a specific area or territory; have a name, a colour or something else to identify the group; possibly have rules or a leader; who may commit crimes together. [yes/no/used to be but not anymore]

Appendix C: Missing data and multiple imputation approach of the study

A total of 19,243 cohort members have taken part in the Millennium Cohort Study. However, over time, as happens in all longitudinal studies, some participants attrit from the study. Even if participating in some part of a particular survey sweep, responses to different elements can vary. In the age 17 survey around 9,500 of cohort members completed the main interview, but only around 6,500 completed the online questionnaire after the interview. Both survey elements measure aspects of offending behaviours. The attrition weights developed for each of the sweep in the MCS is developed for overall participation in the sweep and does not adjust for missingness on particular survey modules or items. Analysis showed that missingness on offending behaviours at age 17 was correlated with previous offending at age 11 and 14, with the most antisocial tending to drop out, or not respond to a particular element like the after interview online questionnaire. To account for this, we use multiple imputation to help 'restore' missing data. This is an efficient method for replicating population estimates in longitudinal data when sections of data are missing.[16] Missing data was imputed back to the age 11 survey, which had just over 13,000 responses, as it is not safe to impute to previous survey sweeps because this would have meant imputing over 50% of missing values for some individuals which is not recommended.[70] Shown in Table C1 is an overview on the main outcomes variables of the current study in terms of missing and complete data and percentage imputed. In addition, weights were used to adjust for attrition between the birth sweep and age 11, and to adjust for the complex sampling design of the initial MCS survey.

A total of 30 datasets were imputed using chained equations, whereby missing data was filled in using information from all other dependent and outcome variables in the dataset, with the addition to several auxiliary variables not included in models, including child cognition and school readiness at age 3, observed positive and negative child behaviours at age 3, and antisocial behaviours at age 11. Listed in Table C2 are all variables included in the imputation model. Shown in Table C3 are results of estimates of offending prevalences using non-imputed data versus imputed data. We see that prevalence are higher for the imputed data, especially for age 17 where there is more attrition from the study than at age 14. Because attrition is related to offending, using only the available data would lead to an underestimation of offending prevalences amongst 17-year-olds.

It is clear the approach taken in this study of imputing missing data made a big difference to the results and conclusions in terms of prevalences of offending behaviours. Results using the unimputed data indicated that the prevalence of many offences, including weapon carrying or use,

had changed very little or even decreased slightly between age 14 and 17. Using the imputed data most offences were instead seen to increase, including carrying or using a weapon.

Table C1: Missing age 17 outcome data imputed back to age 11 survey (N=13,277)

Variable	Missing	Complete	Imputed
Graffiti	3,848	9,429	29%
Vandalism	3,871	9,406	29%
Shoplifting	3,842	9,435	29%
Theft from person	3,847	9,430	29%
Breaking and entering	3,868	9,409	29%
Vehicle theft	3,844	9,433	29%
Fire setting	3,852	9,425	29%
Assault	3,842	9,435	29%
Weapon use	3,843	9,434	29%
Carrying weapon	6,832	6,445	51%
Hacking	3,861	9,416	29%
Virus or malware	3,845	9,432	29%
Online harassment	3,845	9,432	29%
Online bullying	3,843	9,434	29%
Gang membership	6,830	6,447	51%
Stopped by police	6,833	6,444	51%
Cautioned by police	6,839	6,438	52%
Arrested by police	6,840	6,437	52%

Table C2: Variables used in the imputation model

INDIVIDUAL CHARACTERISTICS	Sex at birth
	Age
	Oldest child in household
	Ethnicity
EARLY COGNITIVE AND BEHAVIOURAL CHARACTERISTICS	Vocabulary score age 3
	Bracken school readiness age 3
	Positive child behaviours age 3 (observed)
	Negative child behaviours age 3 (observed)
SOCIOECONOMIC BACKGROUND	Household income weekly (average 9 months to age 11)
	Free school meals at age 5
	Free school meals at age 7
	Highest education in household
	Housing type age 11
EARLY CHILDHOOD ENVIRONMENT	Breastfed ever
	Mother smoked during pregnancy after second month
	Age 3: Safety of home environment (observed)
	Age 3: Positive parenting (observed)

	Age 3: Parent-child relationship (parent reported)
FAMILY RISKS	Main parent mental health problems (9mths-11yrs)
	Domestic abuse between parents (9mths-11yrs)
	Main parent frequent drinker - age 9mths to 11yrs
	Main parent used recreational drugs age 3,5 or 14
	Death of a parent or sibling
	Main parent spent time in care as a child
	Age 11: Bullied by sibling
	Ever a single parent between 9mths and 11yrs
	Age 11: Number of siblings
SCHOOL FACTORS	School connectedness at age 7
	School connectedness at age 11
	Academic interest age 11
	Academic self-concept age 11
	Five or more A*-C GCSEs
	School exclusion in secondary between age 11 and 14
	Persistent truancy (more than just the once) past year at age 14
PEER FACTORS	Age 7: Number of friends
	Age 14: Time spent with friends in leisure time
	Age 14: Victim of peer bullying
	Age 11: Conflict with friends
	Age 14: Friends smoke cigarettes
	Age 14: Friends drink alcohol
	Age 14: Friends take drugs
AREA AND REGION	Age 11: Safety of area
	UK Country
	Region in England
CHILD AND ADOLESCENT MENTAL HEALTH	Childhood externalising problems (age 3-11)
	Childhood internalising problems (age 3-11)
	Age 14: Self-harm in past year
LEISURE ACTIVITIES	Age 14: Social media time use per weekday
	Age 14: Electronic gaming time use per weekday
	Age 14: Organised activities (youth clubs/scouts/girl guides or other)
SUBSTANCE USE AT AGE 14	Age 14: Alcohol frequency in past month
	Age 14: Binge drinking in past year
	Age 14: Tried smoking ever
	Age 14: Regular e-cigarette user
	Age 14: Tried cannabis ever
	Age 14: Tried hard drugs ever
OFFENCES AT AGE 11	Age 11: Caused public nuisance in past year
	Age 11: Graffiti in the past year

	Age 11: Vandalism in the past year
	Age 11: Shoplifting in past year
OFFENCES AT AGE 14	Age 14: Carrying a weapons carrying in past year
	Age 14: Used a weapon in the past year
	Age 14: Assault in past year
	Age 14: Shoplifting in past year
	Age 14: Breaking and entering in the past year
	Age 14: Theft from person in the past year
	Age 14: Graffiti in the past year
	Age 14: Vandalism in the past year
	Age 14: Caused public nuisance in past year
	Age 14: Hacked computer or device in past year
	Age 14: Sent virus, malware or spyware in past year
	Age 14: Ever a gang member
	Age 14: Stopped by police ever
	Age 14: Cautioned by police ever
	Age 14: Arrested by police ever
OFFENCES AT AGE 17	Age 17: Carrying a weapon in past year
	Age 17: Used a weapon in the past year
	Age 17: Assault in past year
	Age 17: Shoplifting in past year
	Age 17: Breaking and entering in the past year
	Age 17: Theft from person in the past year
	Age 17: Vehicle theft in past year
	Age 17: Graffiti in the past year
	Age 17: Vandalism in the past year
	Age 17: Fire setting in past year
	Age 17: Hacked computer or device in past year
	Age 17: Sent virus, malware or spyware in past year
	Age 17: Online bullying in past year
	Age 17: Online harassment in past year
	Age 17: Ever a gang member
	Age 17: Stopped by police ever
	Age 17: Cautioned by police ever
	Age 17: Arrested by police ever
	Age 17: Frequency of graffiti, vandalism, fire setting, shoplifting, breaking and entering, vehicle theft, hacking, and sending virus/malware/spyware

Table C3: Prevalence estimates age 14 and 17 of complete case data versus imputed data

	Unimputed sample						Imputed sample					
	Age 14 (N=11,350) [a]			**Age 17 (N=10,082) [a]**			**Age 14 (N=13,277)**			**Age 17 (N=13,277)**		
	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max
Weapon carrying/use	**3.5**	3.0%	3.9%	**2.9%**	2.4%	3.4%	**3.7%**	3.2%	4.2%	**6.4%**	5.5%	7.3%
Carried a weapon in past year	2.8%	2.5%	3.2%	2.5%	2.1%	3.0%	3.1%	2.6%	3.5%	5.7%	4.8%	6.6%
Used a weapon in past year	1.1%	0.9%	1.4%	1.2%	0.6%	2.3%	1.3%	1.0%	1.6%	1.7%	1.3%	2.1%
Assault in past year	**31.6%**	30.5%	32.7%	**24.9%**	23.1%	26.8%	**31.7%**	30.6%	32.8%	**27.2%**	26.0%	28.4%
Shoplifting in past year	**3.6%**	3.1%	4.2%	**6.9%**	5.7%	8.3%	**4.1%**	3.6%	4.6%	**8.7%**	7.8%	9.6%
Neighbourhood crime (breaking and entering, vehicle crime, theft from person) in past year	**-**			**1.8%**	1.4%	2.2%	**-**			**3.0%**	2.5%	3.5%
Breaking and entering in past year	0.2%	0.1%	0.3%	0.1%	0.1%	0.3%	0.3%	0.1%	0.4%	0.3%	0.1%	0.4%
Vehicle theft in past year	-			0.4%	0.3%	0.7%	-			0.6%	0.3%	0.8%
Theft from person in past year	1.3%	1.0%	1.6%	1.6%	1.2%	2.0%	1.5%	1.2%	1.8%	2.6%	2.1%	3.1%
Criminal damage and arson (graffiti, vandalism, fire setting) in past year	**-**			**5.8%**	5.2%	6.5%	**-**			**9.6%**	8.7%	10.5%
Graffiti in past year	2.9%	2.5%	3.2%	2.8%	2.3%	3.3%	3.2%	2.8%	3.7%	4.8%	4.1%	5.5%
Vandalism in past year	3.6%	3.1%	4.2%	2.9%	2.5%	3.5%	3.9%	3.4%	4.5%	5.6%	4.8%	6.4%
Fire setting in past year	-			2.6%	2.3%	3.0%	-			5.2%	4.6%	5.9%
Cybercrime (hacking/virus) in past year	**5.0%**	4.4%	5.5%	**2.0%**	1.7%	2.4%	**5.6%**	5.0%	6.1%	**5.1%**	4.5%	5.8%
Hacked computer or device in past year	4.8%	4.3%	5.3%	2.1%	1.7%	2.4%	5.2%	4.6%	5.8%	5.0%	4.3%	5.7%
Send virus, malware or spyware in past year	0.9%	0.7%	1.2%	0.4%	0.2%	0.6%	1.1%	0.8%	1.4%	1.6%	1.0%	2.2%
Online bullying, harassment in past year				**2.8%**	2.2%	3.5%				**3.4%**	2.9%	3.9%
Online bullying in past year				1.1%	0.8%	1.5%				1.6%	1.2%	1.9%

	Unimputed sample						Imputed sample					
	Age 14 (N=11,350) [a]			Age 17 (N=10,082) [a]			Age 14 (N=13,277)			Age 17 (N=13,277)		
	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max	Prevalence	CI_min	CI_max
Online harassment in past year				1.8%	1.4%	2.3%				2.2%	1.8%	2.6%

[a] Sample size are those providing some information in this sweep, but response to individual items vary (See Table C2 for available data for each offending variable at age 17)

Appendix D: Prevalence of other offences at age 17 by various factors

Table D1: Prevalence of offences at age 17 by individual characteristics

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Sex																		
Female	17.4%	16.0%	18.9%	7.1%	6.2%	8.1%	2.1%	1.5%	2.7%	6.5%	5.5%	7.5%	3.8%	3.0%	4.6%	2.8%	2.2%	3.4%
Male	36.3%	34.6%	38.1%	10.1%	8.7%	11.6%	3.8%	3.0%	4.6%	12.5%	11.1%	13.9%	6.4%	5.4%	7.4%	3.9%	3.1%	4.6%
Age categories																		
Under 17	28.5%	26.4%	30.6%	8.1%	6.5%	9.7%	3.0%	2.1%	3.9%	8.8%	7.3%	10.3%	4.6%	3.3%	5.8%	3.0%	2.2%	3.9%
17-17.3	26.9%	25.1%	28.7%	8.8%	7.5%	10.1%	3.0%	2.3%	3.7%	9.8%	8.5%	11.1%	5.3%	4.3%	6.3%	3.5%	2.8%	4.3%
17.3-17.5	27.3%	24.5%	30.1%	8.6%	6.6%	10.5%	2.5%	1.4%	3.6%	9.2%	7.1%	11.3%	5.0%	3.2%	6.8%	3.5%	2.4%	4.7%
over 17.5	25.4%	22.3%	28.5%	9.6%	7.3%	11.9%	3.6%	2.1%	5.1%	10.8%	8.6%	13.0%	5.9%	3.6%	8.2%	3.3%	2.0%	4.6%
Eldest child in household																		
No	26.9%	25.4%	28.3%	8.6%	7.5%	9.7%	3.1%	2.4%	3.8%	9.8%	8.5%	11.0%	5.0%	4.1%	5.9%	3.4%	2.7%	4.0%
Yes	27.7%	25.8%	29.5%	8.8%	7.3%	10.2%	2.8%	2.1%	3.6%	9.4%	8.1%	10.6%	5.3%	4.3%	6.3%	3.4%	2.6%	4.1%
Ethnicity 6 categories																		
White	27.0%	25.7%	28.3%	8.9%	7.9%	9.9%	3.0%	2.4%	3.5%	10.0%	9.0%	11.0%	5.3%	4.6%	6.0%	3.5%	3.0%	4.0%
Mixed	35.3%	28.7%	41.9%	12.3%	6.9%	17.8%	4.9%	1.4%	8.4%	12.7%	7.3%	18.2%	6.0%	1.0%	11.1%	2.9%	0.0%	5.8%
Indian	25.7%	18.0%	33.3%	4.7%	1.2%	8.3%	1.1%	-1.2%	3.3%	5.6%	1.6%	9.7%	3.2%	-0.4%	6.8%	2.4%	0.2%	4.6%
Pakistani & Bangladeshi	21.3%	17.1%	25.5%	3.4%	1.6%	5.2%	1.6%	0.4%	2.7%	3.8%	2.2%	5.5%	2.4%	0.9%	4.0%	1.3%	0.5%	2.2%
Black or Black British	32.7%	26.2%	39.3%	9.5%	6.3%	12.6%	5.5%	2.4%	8.6%	8.4%	3.9%	12.8%	5.7%	1.6%	9.8%	4.4%	1.4%	7.3%
Other incl Chinese	27.7%	18.8%	36.6%	8.3%	1.9%	14.7%	1.7%	-1.8%	5.3%	8.0%	1.4%	14.6%	2.7%	-2.3%	7.7%	3.1%	-1.1%	7.3%

Table D2: Prevalence of offences at age 17 by socioeconomic background

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
SOCIOECONOMIC BACKGROUND	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Household income weekly (average 9mths to age 11)																		
lowest 20%	28.2%	25.3%	31.1%	9.2%	7.0%	11.3%	3.5%	2.0%	4.9%	11.3%	9.0%	13.6%	6.0%	4.2%	7.7%	4.0%	2.6%	5.4%
20-40%	28.7%	25.8%	31.6%	9.2%	7.2%	11.2%	3.0%	1.9%	4.2%	10.7%	8.6%	12.8%	5.4%	3.9%	7.0%	3.7%	2.4%	4.9%
40-60%	25.0%	22.5%	27.4%	9.0%	7.2%	10.8%	2.9%	1.9%	3.9%	9.0%	7.3%	10.7%	5.0%	3.5%	6.4%	3.0%	1.9%	4.0%
60-80%	26.8%	24.4%	29.2%	8.0%	6.3%	9.6%	2.7%	1.7%	3.6%	8.7%	7.0%	10.4%	4.6%	3.3%	6.0%	2.9%	2.0%	3.9%
highest 80-100%	27.0%	24.6%	29.5%	8.0%	6.3%	9.6%	2.8%	1.9%	3.8%	7.8%	6.3%	9.2%	4.5%	3.3%	5.7%	3.1%	2.2%	4.0%
Free school meals age 5 or 7																		
No	26.8%	25.4%	28.1%	8.4%	7.5%	9.4%	2.8%	2.3%	3.3%	9.0%	8.1%	9.9%	4.8%	4.0%	5.5%	3.2%	2.7%	3.7%
Yes	28.7%	25.9%	31.6%	9.6%	7.5%	11.6%	3.6%	2.3%	4.9%	11.5%	9.3%	13.8%	6.4%	4.7%	8.1%	4.0%	2.8%	5.3%
Highest education in household (categories)																		
None	25.5%	21.5%	29.6%	8.3%	5.4%	11.2%	3.4%	1.4%	5.4%	10.9%	7.6%	14.2%	6.4%	3.8%	9.0%	3.7%	2.0%	5.4%
NVQ 1	28.1%	23.1%	33.1%	8.5%	5.0%	12.0%	2.8%	0.9%	4.7%	9.1%	5.6%	12.7%	5.1%	2.3%	7.9%	4.8%	2.5%	7.1%
NVQ 2	27.7%	25.4%	29.9%	8.8%	7.2%	10.4%	3.2%	2.3%	4.0%	10.6%	8.8%	12.4%	5.5%	4.2%	6.8%	3.6%	2.5%	4.6%
NVQ 3	26.8%	24.0%	29.6%	8.3%	6.3%	10.4%	2.8%	1.6%	3.9%	9.6%	7.6%	11.5%	5.1%	3.7%	6.5%	3.2%	2.1%	4.4%
NVQ 4	27.4%	25.6%	29.2%	8.9%	7.5%	10.4%	2.9%	2.1%	3.7%	8.7%	7.5%	9.9%	4.7%	3.8%	5.6%	2.8%	2.1%	3.5%
NVQ 5	26.9%	23.1%	30.7%	8.7%	6.1%	11.3%	2.8%	1.4%	4.1%	8.4%	6.0%	10.8%	3.8%	1.9%	5.6%	3.4%	2.1%	4.8%
Highest education in household (binary)																		
Less than a degree	27.1%	25.4%	28.8%	8.5%	7.4%	9.7%	3.1%	2.4%	3.7%	10.2%	8.9%	11.5%	5.5%	4.6%	6.4%	3.6%	2.9%	4.3%
Degree or higher	27.3%	25.6%	29.0%	8.9%	7.5%	10.3%	2.9%	2.2%	3.7%	8.6%	7.5%	9.8%	4.5%	3.7%	5.4%	2.9%	2.3%	3.6%
Housing type age 11																		
Own outright or mortgage	25.3%	23.9%	26.7%	7.8%	6.8%	8.8%	2.6%	2.1%	3.1%	8.0%	7.1%	8.9%	4.3%	3.5%	5.0%	2.9%	2.4%	3.5%
Rent public or private	30.0%	27.9%	32.1%	9.9%	8.5%	11.4%	3.6%	2.6%	4.5%	11.9%	10.3%	13.5%	6.4%	5.2%	7.6%	4.0%	3.0%	4.9%

Table D3: Prevalence of offences at age 17 by early childhood environment

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Breastfed																		
No	27.1%	24.8%	29.5%	8.8%	7.1%	10.6%	2.9%	1.8%	4.0%	10.9%	9.0%	12.8%	5.9%	4.5%	7.3%	3.6%	2.7%	4.6%
Yes	27.2%	25.9%	28.6%	8.6%	7.6%	9.7%	3.0%	2.5%	3.6%	8.9%	7.9%	9.9%	4.7%	4.0%	5.5%	3.2%	2.7%	3.8%
Mother smoked during pregnancy																		
No	26.5%	25.2%	27.8%	8.4%	7.4%	9.3%	2.8%	2.3%	3.3%	8.9%	8.0%	9.9%	4.9%	4.2%	5.7%	3.0%	2.5%	3.5%
Yes	30.5%	27.2%	33.8%	10.1%	7.5%	12.8%	3.9%	2.5%	5.4%	12.6%	9.9%	15.2%	6.1%	4.3%	7.9%	5.1%	3.5%	6.7%
Safety of home environment (observed) age 3																		
Lowest	31.3%	26.1%	36.4%	10.0%	5.6%	14.4%	5.1%	2.2%	8.0%	12.5%	8.1%	16.9%	6.7%	3.4%	10.1%	3.9%	1.1%	6.6%
Medium	28.1%	24.6%	31.6%	9.8%	7.2%	12.3%	3.1%	1.6%	4.6%	10.4%	7.9%	12.9%	5.8%	3.7%	8.0%	3.8%	2.2%	5.3%
High	26.8%	25.5%	28.1%	8.4%	7.5%	9.4%	2.8%	2.3%	3.3%	9.3%	8.3%	10.2%	4.9%	4.2%	5.6%	3.3%	2.7%	3.8%
Positive parenting (observed) age 3																		
Lowest	30.6%	25.5%	35.8%	9.9%	6.7%	13.1%	3.9%	1.7%	6.0%	12.3%	8.6%	16.0%	7.7%	4.5%	10.9%	3.7%	1.6%	5.8%
Medium	28.4%	25.0%	31.8%	9.7%	7.2%	12.1%	3.3%	1.8%	4.8%	9.8%	7.6%	11.9%	5.8%	3.9%	7.7%	3.7%	2.1%	5.2%
High	26.6%	25.3%	27.9%	8.4%	7.4%	9.4%	2.9%	2.3%	3.4%	9.3%	8.3%	10.2%	4.8%	4.1%	5.4%	3.3%	2.7%	3.8%
Parent-child relationship (parent reported) age 3																		
lowest 20%	28.2%	25.3%	31.1%	9.7%	7.6%	11.8%	4.0%	2.9%	5.2%	11.4%	9.4%	13.4%	6.0%	4.3%	7.8%	3.7%	2.4%	4.9%
20-40%	28.6%	26.0%	31.1%	8.6%	6.8%	10.4%	3.3%	2.0%	4.6%	9.4%	7.3%	11.5%	5.3%	3.7%	6.9%	4.0%	2.8%	5.2%
40-60%	27.2%	24.8%	29.6%	8.6%	6.9%	10.3%	2.7%	1.7%	3.6%	9.4%	7.7%	11.1%	4.4%	3.2%	5.7%	3.1%	2.1%	4.2%
60-80%	26.4%	23.8%	29.0%	8.2%	6.4%	10.1%	2.6%	1.6%	3.6%	9.1%	7.1%	11.0%	5.4%	3.8%	6.9%	2.9%	1.9%	3.9%
highest 80-100%	25.8%	23.6%	27.9%	8.3%	6.7%	9.8%	2.4%	1.6%	3.3%	8.7%	7.3%	10.1%	4.7%	3.5%	5.9%	3.1%	2.2%	4.0%

Table D4: Prevalence of offences at age 17 by family risks

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Main parent mental health problems (9mths-11yrs)																		
lowest 20%	24.8%	22.0%	27.5%	7.6%	5.8%	9.3%	2.1%	1.2%	3.1%	7.8%	6.1%	9.5%	4.1%	2.7%	5.6%	2.9%	2.0%	3.9%
20-40%	26.4%	24.1%	28.7%	8.3%	6.4%	10.1%	2.7%	1.8%	3.7%	8.7%	7.1%	10.3%	4.9%	3.6%	6.3%	2.8%	1.8%	3.8%
40-60%	27.1%	24.6%	29.7%	8.2%	6.6%	9.7%	3.2%	2.0%	4.3%	9.6%	7.7%	11.5%	4.9%	3.6%	6.2%	3.5%	2.4%	4.6%
60-80%	28.3%	25.6%	31.0%	8.8%	7.1%	10.5%	3.3%	2.1%	4.4%	10.3%	8.6%	12.1%	5.3%	3.9%	6.8%	3.7%	2.6%	4.8%
highest 80-100%	29.1%	26.6%	31.6%	10.4%	8.4%	12.4%	3.6%	2.4%	4.8%	11.2%	9.1%	13.2%	6.2%	4.7%	7.7%	3.8%	2.7%	5.0%
Domestic abuse between parents (9mths-11yrs)																		
No	26.0%	24.7%	27.4%	8.2%	7.2%	9.2%	2.8%	2.2%	3.4%	8.9%	8.0%	9.9%	4.8%	4.0%	5.5%	3.0%	2.5%	3.6%
Yes	31.3%	28.8%	33.8%	10.3%	8.3%	12.3%	3.7%	2.6%	4.8%	11.9%	9.9%	13.9%	6.3%	4.8%	7.8%	4.5%	3.3%	5.7%
Main parent frequent drinker - age 9mths to 11yrs																		
No	26.9%	25.5%	28.2%	8.4%	7.4%	9.3%	2.9%	2.3%	3.4%	9.4%	8.4%	10.4%	5.1%	4.3%	5.8%	3.3%	2.7%	3.8%
Yes	28.9%	25.8%	32.0%	10.4%	8.1%	12.7%	3.6%	2.3%	4.9%	10.8%	8.3%	13.2%	5.5%	3.8%	7.1%	3.9%	2.6%	5.2%
Main parent used recreational drugs age 3,5 or 14																		
No	26.3%	25.0%	27.6%	8.1%	7.1%	9.0%	2.8%	2.3%	3.3%	8.9%	8.0%	9.7%	5.1%	4.3%	5.8%	3.0%	2.6%	3.5%
Yes	36.5%	31.4%	41.7%	15.3%	11.2%	19.4%	5.1%	2.5%	7.7%	17.2%	12.7%	21.6%	5.9%	2.7%	9.0%	7.1%	3.8%	10.3%
Death of a parent or sibling																		
No	27.2%	26.0%	28.4%	8.7%	7.7%	9.6%	2.9%	2.4%	3.4%	9.5%	8.7%	10.4%	5.1%	4.4%	5.8%	3.3%	2.9%	3.8%
Yes	26.8%	14.7%	38.9%	10.5%	2.1%	18.8%	6.0%	-0.9%	12.9%	11.7%	3.4%	19.9%	7.8%	-0.5%	16.1%	4.0%	-1.6%	9.6%
Main parent spent time in care as a child																		
No	27.1%	25.9%	28.3%	8.6%	7.7%	9.6%	2.9%	2.4%	3.4%	9.5%	8.6%	10.4%	5.1%	4.4%	5.8%	3.3%	2.8%	3.8%
Yes	33.6%	23.7%	43.5%	10.8%	3.7%	18.0%	5.9%	1.0%	10.8%	14.1%	5.7%	22.5%	7.1%	1.2%	13.0%	5.1%	0.5%	9.8%
Bullied by sibling age 11																		
No	24.9%	22.5%	27.3%	7.8%	6.2%	9.4%	2.7%	1.7%	3.6%	8.3%	6.7%	10.0%	4.7%	3.5%	5.9%	2.8%	1.8%	3.7%
Yes	27.9%	26.5%	29.3%	8.9%	7.9%	9.9%	3.0%	2.4%	3.6%	9.8%	8.8%	10.8%	5.3%	4.4%	6.1%	3.5%	2.9%	4.1%

Ever single parent (9mths and 11yrs)																		
No	25.3%	24.0%	26.7%	7.6%	6.6%	8.6%	2.4%	1.9%	2.9%	7.9%	7.0%	8.8%	4.4%	3.6%	5.1%	2.9%	2.4%	3.4%
Yes	30.2%	28.0%	32.3%	10.4%	8.8%	12.0%	3.9%	3.0%	4.9%	12.2%	10.5%	13.9%	6.4%	5.0%	7.7%	4.1%	3.1%	5.1%
Number of siblings age 11																		
None	28.7%	25.3%	32.1%	9.5%	7.1%	11.9%	3.3%	2.0%	4.6%	11.1%	8.6%	13.5%	5.9%	3.9%	8.0%	3.7%	2.3%	5.2%
1 sib	26.1%	24.4%	27.9%	8.4%	7.2%	9.5%	2.8%	2.1%	3.5%	9.1%	7.9%	10.3%	4.6%	3.8%	5.5%	3.4%	2.7%	4.1%
2 sibs	27.9%	25.8%	30.0%	8.7%	7.1%	10.3%	3.2%	2.2%	4.2%	9.8%	8.3%	11.3%	5.5%	4.2%	6.9%	3.3%	2.4%	4.1%
3 sibs	26.4%	23.1%	29.7%	8.6%	6.2%	11.0%	2.9%	1.5%	4.3%	9.5%	7.2%	11.8%	4.7%	3.0%	6.3%	3.2%	1.9%	4.5%
3 or more	30.0%	25.3%	34.7%	9.3%	5.8%	12.7%	3.0%	1.0%	4.9%	9.3%	5.8%	12.8%	6.2%	2.9%	9.4%	3.1%	1.0%	5.2%

Table D5: Prevalence of offences at age 17 by school factors

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
School connectedness age 7 and 11																		
lowest 20%	36.5%	33.7%	39.3%	11.7%	9.3%	14.0%	4.4%	3.0%	5.9%	14.5%	12.3%	16.7%	7.5%	5.6%	9.3%	5.1%	3.7%	6.5%
20-40%	29.1%	26.5%	31.8%	8.6%	6.9%	10.3%	3.3%	2.3%	4.3%	9.9%	8.0%	11.8%	5.6%	4.2%	6.9%	3.3%	2.3%	4.4%
40-60%	27.0%	24.2%	29.8%	8.7%	6.9%	10.6%	2.2%	1.3%	3.1%	9.0%	7.2%	10.7%	4.6%	3.2%	6.0%	3.2%	2.2%	4.3%
60-80%	23.3%	21.0%	25.5%	7.9%	6.3%	9.6%	2.7%	1.8%	3.6%	8.0%	6.4%	9.6%	4.3%	3.1%	5.6%	2.8%	1.9%	3.8%
highest 80-100%	19.2%	16.7%	21.6%	6.2%	4.6%	7.8%	2.3%	1.2%	3.3%	6.0%	4.4%	7.6%	3.5%	2.2%	4.8%	2.2%	1.3%	3.0%
Academic interest age 11																		
lowest	29.8%	26.1%	33.4%	10.7%	7.8%	13.5%	3.9%	2.1%	5.7%	11.8%	8.5%	15.0%	6.4%	4.3%	8.4%	3.7%	2.3%	5.1%
2	26.8%	24.1%	29.4%	9.2%	7.4%	11.0%	3.4%	2.4%	4.5%	10.0%	8.1%	11.9%	5.0%	3.4%	6.5%	3.5%	2.4%	4.6%
3	27.8%	25.9%	29.8%	8.1%	6.7%	9.6%	2.7%	1.9%	3.5%	9.4%	7.9%	10.9%	5.0%	3.8%	6.2%	3.3%	2.5%	4.1%
4	26.6%	24.4%	28.7%	8.7%	7.0%	10.5%	2.6%	1.8%	3.5%	9.4%	7.8%	11.0%	5.2%	3.9%	6.4%	3.3%	2.3%	4.2%
highest	25.4%	22.1%	28.6%	7.1%	5.0%	9.3%	3.0%	1.6%	4.5%	7.7%	5.5%	9.9%	4.6%	2.7%	6.4%	3.2%	1.7%	4.6%
Academic self-concept age 11																		
lowest	27.2%	24.9%	29.5%	9.1%	7.2%	10.9%	3.5%	2.4%	4.6%	10.2%	8.3%	12.0%	5.1%	3.7%	6.4%	3.3%	2.3%	4.4%
2	26.8%	24.7%	29.0%	8.6%	7.1%	10.0%	3.1%	2.2%	3.9%	9.2%	7.7%	10.8%	5.2%	4.0%	6.3%	3.4%	2.5%	4.3%
3	26.5%	24.4%	28.7%	8.3%	6.6%	9.9%	2.5%	1.7%	3.4%	9.1%	7.3%	11.0%	4.7%	3.4%	6.0%	3.6%	2.7%	4.6%
highest	28.4%	25.9%	30.9%	8.9%	7.1%	10.7%	2.9%	1.9%	3.9%	9.9%	8.2%	11.6%	5.6%	4.3%	7.0%	3.0%	2.0%	4.0%
Five or more A*-C GCSEs																		
No	29.3%	27.5%	31.1%	10.0%	8.5%	11.4%	4.0%	3.1%	4.8%	11.8%	10.3%	13.2%	5.9%	4.7%	7.2%	4.1%	3.1%	5.0%
Yes	25.6%	24.0%	27.2%	7.7%	6.5%	8.8%	2.3%	1.7%	2.8%	7.9%	6.7%	9.1%	4.5%	3.6%	5.4%	2.8%	2.3%	3.4%
School exclusion in secondary between age 11 and 14																		
No	25.9%	24.6%	27.2%	8.2%	7.3%	9.1%	2.7%	2.2%	3.1%	8.7%	7.8%	9.6%	4.6%	4.0%	5.3%	3.0%	2.5%	3.5%
Yes	44.3%	38.6%	50.1%	15.3%	10.4%	20.2%	7.4%	3.8%	11.0%	21.1%	15.5%	26.7%	11.6%	6.7%	16.4%	8.0%	4.6%	11.3%
Persistent truancy (more than just the once) past year at age 14																		

No	26.2%	24.9%	27.4%	8.0%	7.1%	8.9%	2.7%	2.2%	3.1%	8.7%	7.8%	9.6%	4.8%	4.1%	5.5%	3.1%	2.6%	3.6%
Yes	45.1%	38.9%	51.3%	20.6%	14.8%	26.3%	8.7%	4.6%	12.8%	24.5%	18.6%	30.4%	11.2%	6.8%	15.6%	7.8%	4.2%	11.4%

Table D6: Prevalence of offences at age 17 by peer factors

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Age 7: Number of friends																		
Lots	27.1%	25.7%	28.5%	8.4%	7.3%	9.5%	2.9%	2.3%	3.5%	9.0%	8.0%	10.0%	5.1%	4.1%	6.1%	3.4%	2.8%	4.0%
Some	26.9%	24.6%	29.1%	9.0%	7.3%	10.7%	3.0%	2.0%	4.0%	10.5%	8.9%	12.1%	5.3%	4.0%	6.5%	3.3%	2.3%	4.3%
Not many	28.6%	24.7%	32.4%	9.6%	7.0%	12.2%	3.4%	1.7%	5.1%	10.7%	8.0%	13.3%	5.3%	3.2%	7.4%	3.2%	1.6%	4.7%
Age 14: Time spent with friends in leisure time																		
Most days	29.6%	27.6%	31.6%	10.6%	9.0%	12.2%	3.6%	2.6%	4.6%	12.4%	10.7%	14.2%	5.8%	4.6%	7.0%	4.2%	3.3%	5.0%
At least one a week	26.9%	24.9%	28.8%	8.5%	7.2%	9.8%	2.7%	1.9%	3.4%	8.6%	7.2%	9.9%	5.0%	3.9%	6.1%	2.9%	2.1%	3.7%
At least once a month	23.9%	21.3%	26.5%	6.6%	4.9%	8.3%	2.4%	1.5%	3.4%	6.9%	5.3%	8.6%	4.1%	2.8%	5.5%	3.1%	1.9%	4.2%
Less than once a month	24.7%	21.1%	28.3%	5.4%	3.4%	7.3%	2.8%	1.2%	4.4%	6.5%	4.0%	9.0%	4.5%	2.7%	6.2%	2.3%	1.0%	3.6%
Age 14: Victim of peer bullying																		
Never	23.4%	21.9%	24.9%	7.5%	6.3%	8.6%	2.4%	1.8%	3.0%	8.4%	7.3%	9.4%	4.6%	3.6%	5.5%	2.5%	2.0%	3.1%
Less than every few months	27.9%	25.7%	30.0%	9.2%	7.6%	10.8%	3.4%	2.5%	4.3%	9.5%	7.9%	11.1%	5.1%	4.0%	6.3%	3.7%	2.7%	4.6%
Once a month to every few months	34.2%	30.2%	38.1%	10.3%	7.4%	13.1%	3.3%	1.9%	4.8%	12.4%	9.4%	15.4%	6.2%	4.3%	8.2%	4.4%	2.8%	6.0%
Most days to once a week	36.6%	32.9%	40.3%	11.5%	8.8%	14.2%	4.4%	2.7%	6.2%	12.8%	10.2%	15.5%	6.8%	4.3%	9.4%	5.4%	3.4%	7.3%
Age 11: Conflict with friends																		
Never	24.2%	22.3%	26.2%	7.3%	5.9%	8.7%	2.6%	1.7%	3.4%	8.4%	6.9%	9.8%	4.4%	3.3%	5.5%	2.4%	1.6%	3.1%
Less than once a month	27.5%	25.7%	29.4%	8.6%	7.2%	10.1%	3.0%	2.2%	3.7%	9.3%	8.0%	10.5%	5.1%	4.0%	6.2%	3.4%	2.6%	4.2%
At least once a month	28.8%	26.3%	31.3%	10.3%	8.4%	12.2%	3.0%	1.8%	4.2%	11.2%	9.3%	13.1%	5.9%	4.3%	7.6%	4.1%	3.0%	5.2%
Most days or weekly	29.6%	26.2%	32.9%	9.2%	6.9%	11.6%	3.7%	2.4%	5.1%	10.5%	8.2%	12.9%	5.5%	3.7%	7.3%	4.0%	2.6%	5.5%
Age 14: Friends smoke cigarettes																		

No	23.2%	21.8%	24.6%	6.3%	5.4%	7.2%	2.2%	1.7%	2.7%	6.7%	5.8%	7.6%	4.2%	3.4%	5.1%	2.4%	2.0%	2.9%
Yes	33.8%	31.7%	35.9%	12.6%	10.8%	14.4%	4.3%	3.3%	5.3%	14.4%	12.7%	16.1%	6.6%	5.3%	8.0%	4.9%	3.8%	5.9%
Age 14: Friends drink alcohol																		
No	21.4%	19.6%	23.2%	5.9%	4.8%	7.0%	2.3%	1.6%	3.1%	6.1%	4.8%	7.4%	3.9%	2.9%	5.0%	2.4%	1.7%	3.1%
Yes	31.4%	29.7%	33.2%	10.7%	9.5%	12.0%	3.5%	2.7%	4.2%	12.1%	10.9%	13.4%	6.0%	5.0%	7.0%	4.1%	3.4%	4.7%
Age 14: Friends take drugs																		
No	23.5%	22.2%	24.8%	6.4%	5.6%	7.2%	2.3%	1.8%	2.8%	7.1%	6.2%	7.9%	4.3%	3.5%	5.0%	2.5%	2.1%	3.0%
Yes	38.9%	36.0%	41.7%	16.0%	13.5%	18.5%	5.2%	3.8%	6.6%	17.6%	15.2%	19.9%	7.9%	6.1%	9.6%	6.0%	4.6%	7.4%

Table D7: Prevalence of offences at age 17 by area and region

	Age 17: Assault			**Age 17: Shoplifting**			**Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person**			**Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)**			**Age 17: Cybercrime (hacking/virus)**			**Age 17: Online bullying, harassment**		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Safety of area age 11																		
Very safe	26.3%	24.2%	28.4%	8.5%	7.1%	9.9%	3.0%	2.0%	4.0%	10.1%	8.6%	11.6%	5.2%	4.1%	6.4%	3.0%	2.2%	3.9%
Safe	27.7%	26.2%	29.2%	8.9%	7.8%	10.1%	3.0%	2.3%	3.6%	9.3%	8.1%	10.4%	5.0%	4.1%	5.9%	3.3%	2.7%	3.9%
Not very safe	27.4%	23.9%	31.0%	7.8%	5.5%	10.1%	2.9%	1.5%	4.3%	9.6%	6.9%	12.3%	5.3%	3.2%	7.4%	4.6%	2.9%	6.4%
Not at all safe	25.3%	15.9%	34.8%	8.0%	1.0%	15.0%	3.4%	-0.3%	7.2%	11.7%	3.3%	20.0%	7.8%	1.2%	14.5%	5.4%	0.8%	10.1%
UK country																		
England	27.5%	26.1%	28.8%	8.8%	7.7%	9.9%	3.0%	2.5%	3.6%	9.5%	8.5%	10.6%	5.1%	4.4%	5.9%	3.3%	2.7%	3.9%
Wales	25.4%	22.3%	28.4%	8.3%	6.2%	10.4%	3.0%	1.8%	4.2%	9.8%	7.7%	12.0%	5.2%	3.4%	7.1%	3.6%	2.3%	4.9%
Scotland	25.0%	21.8%	28.2%	8.9%	6.6%	11.1%	2.6%	1.3%	4.0%	10.2%	7.9%	12.5%	5.5%	3.2%	7.8%	3.8%	2.3%	5.3%
N.Ireland	28.5%	25.3%	31.7%	6.3%	4.3%	8.4%	3.0%	1.5%	4.4%	8.8%	6.4%	11.2%	4.5%	2.6%	6.5%	3.5%	2.0%	5.0%
Regions in England																		
North East	20.8%	15.1%	26.4%	6.2%	2.3%	10.2%	2.5%	0.3%	4.7%	7.9%	3.4%	12.4%	5.3%	1.9%	8.8%	4.0%	1.4%	6.7%
North West	26.9%	23.8%	30.0%	9.4%	6.7%	12.0%	3.4%	1.7%	5.1%	9.6%	7.0%	12.3%	5.1%	2.7%	7.6%	3.5%	2.0%	5.0%
Yorkshire and the Humber	25.7%	22.0%	29.4%	6.3%	4.0%	8.6%	2.0%	0.8%	3.3%	8.4%	6.1%	10.6%	3.4%	1.8%	5.1%	2.5%	1.1%	3.8%

East Midlands	27.1%	22.8%	31.4%	7.3%	4.4%	10.1%	2.6%	1.0%	4.2%	8.5%	5.5%	11.4%	3.5%	1.3%	5.7%	3.8%	1.9%	5.7%
West Midlands	26.8%	22.6%	30.9%	8.2%	5.0%	11.4%	2.8%	1.1%	4.4%	8.2%	5.4%	11.0%	5.7%	3.7%	7.8%	2.2%	0.6%	3.8%
East of England	27.7%	24.1%	31.3%	8.3%	5.8%	10.9%	2.4%	1.0%	3.8%	9.4%	6.6%	12.2%	5.1%	2.8%	7.4%	2.9%	1.4%	4.3%
London	31.2%	27.4%	35.1%	9.3%	6.2%	12.4%	4.1%	2.1%	6.2%	9.0%	5.9%	12.0%	4.9%	2.8%	7.0%	3.3%	2.0%	4.6%
South East	27.6%	24.4%	30.8%	11.1%	8.6%	13.7%	3.0%	1.8%	4.3%	11.5%	8.9%	14.0%	5.9%	4.0%	7.7%	3.0%	1.7%	4.4%
South West	28.7%	24.7%	32.8%	9.5%	6.5%	12.6%	3.7%	1.7%	5.7%	11.1%	7.9%	14.4%	6.5%	4.0%	8.9%	5.0%	3.0%	6.9%

Table D8: Prevalence of offences at age 17 by child and adolescent mental health

	Age 17: Assault			**Age 17: Shoplifting**			**Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person**			**Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)**			**Age 17: Cybercrime (hacking/virus)**			**Age 17: Online bullying, harassment**		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Childhood externalising problems (age 3-11)																		
lowest 20%	20.6%	17.9%	23.2%	7.4%	5.7%	9.1%	2.0%	1.0%	3.0%	6.6%	4.9%	8.3%	3.8%	2.7%	5.0%	2.6%	1.7%	3.5%
20-40%	24.5%	22.1%	26.9%	7.9%	6.3%	9.5%	2.3%	1.3%	3.2%	7.9%	6.3%	9.4%	4.4%	3.1%	5.8%	2.5%	1.5%	3.5%
40-60%	27.0%	24.3%	29.7%	8.3%	6.5%	10.1%	2.9%	1.9%	3.9%	8.7%	7.0%	10.5%	4.6%	3.2%	5.9%	3.6%	2.5%	4.6%
60-80%	28.5%	25.6%	31.5%	8.8%	7.1%	10.5%	3.0%	2.0%	4.0%	9.8%	7.8%	11.8%	5.2%	3.7%	6.6%	3.3%	2.3%	4.4%
highest 80-100%	32.9%	30.2%	35.6%	10.5%	8.3%	12.7%	4.4%	3.1%	5.7%	13.6%	11.2%	15.9%	7.0%	5.2%	8.9%	4.5%	3.2%	5.7%
Childhood internalising problems (age 3-11)																		
lowest 20%	27.1%	24.3%	29.9%	8.9%	7.0%	10.7%	3.3%	2.1%	4.5%	8.6%	6.6%	10.6%	4.5%	3.0%	6.0%	3.2%	2.0%	4.5%
20-40%	27.2%	24.8%	29.6%	9.0%	7.3%	10.7%	2.6%	1.7%	3.5%	9.3%	7.6%	11.0%	4.6%	3.1%	6.0%	2.9%	1.9%	3.8%
40-60%	27.5%	24.9%	30.1%	8.7%	7.0%	10.5%	2.8%	1.8%	3.8%	9.3%	7.6%	11.0%	4.8%	3.4%	6.2%	3.1%	2.2%	4.1%
60-80%	27.3%	24.7%	29.9%	8.5%	6.6%	10.3%	2.8%	1.8%	3.9%	9.6%	7.9%	11.3%	5.2%	3.6%	6.9%	3.7%	2.6%	4.8%
highest 80-100%	26.9%	24.2%	29.7%	8.4%	6.6%	10.2%	3.5%	2.3%	4.7%	10.7%	8.6%	12.8%	6.3%	4.7%	7.9%	3.8%	2.6%	4.9%
Age 14: Self-harmed in past year																		
No	26.0%	24.8%	27.3%	7.6%	6.6%	8.6%	2.7%	2.1%	3.2%	8.8%	7.9%	9.7%	4.6%	3.9%	5.3%	2.9%	2.4%	3.5%
Yes	33.4%	30.2%	36.6%	14.3%	11.8%	16.8%	4.8%	3.4%	6.2%	14.0%	11.2%	16.8%	7.8%	5.8%	9.9%	5.6%	4.0%	7.1%

Table D9: Prevalence of offences at age 17 by leisure activities at age 14

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Age 14: Social media time per weekday																		
None	21.8%	17.9%	25.6%	6.0%	3.4%	8.5%	3.1%	1.4%	4.8%	6.8%	4.4%	9.3%	4.5%	2.4%	6.6%	2.1%	0.6%	3.7%
Less than half hour	24.1%	21.2%	27.0%	6.4%	4.4%	8.3%	2.3%	1.1%	3.6%	6.8%	4.6%	8.9%	4.2%	2.3%	6.0%	2.2%	1.0%	3.4%
Half an hour to less than 1	27.1%	24.3%	30.0%	7.7%	5.9%	9.6%	2.7%	1.7%	3.8%	9.3%	7.0%	11.5%	4.1%	2.7%	5.6%	1.9%	0.9%	2.9%
1 hour to less than 2	27.4%	24.7%	30.0%	8.6%	6.8%	10.4%	2.7%	1.6%	3.8%	10.0%	7.9%	12.1%	5.0%	3.5%	6.6%	2.9%	1.8%	3.9%
2 hours to less than 3	27.7%	24.7%	30.6%	10.1%	7.8%	12.3%	3.2%	2.0%	4.5%	10.3%	8.0%	12.5%	5.6%	3.8%	7.5%	3.4%	2.2%	4.6%
3 hours to less than 5	28.0%	25.0%	31.0%	9.3%	7.1%	11.5%	3.3%	1.8%	4.8%	10.3%	8.0%	12.7%	5.1%	3.2%	7.0%	5.0%	3.5%	6.5%
5 hours to less than 7	29.1%	25.7%	32.6%	9.8%	7.0%	12.5%	3.5%	1.8%	5.2%	10.5%	7.6%	13.3%	5.6%	3.4%	7.8%	4.3%	2.6%	6.0%
7 hours or more	31.2%	27.3%	35.1%	11.0%	8.1%	13.9%	3.3%	1.5%	5.2%	11.9%	8.9%	14.9%	7.2%	4.7%	9.6%	5.2%	3.3%	7.2%
Age 14: Electronic gaming time per weekday																		
None	18.1%	15.7%	20.4%	7.9%	6.3%	9.5%	2.2%	1.2%	3.2%	6.6%	5.0%	8.2%	3.7%	2.4%	4.9%	2.9%	1.9%	3.9%
Less than half hour	20.0%	17.3%	22.7%	7.7%	5.7%	9.6%	2.3%	1.2%	3.5%	6.5%	4.5%	8.5%	3.6%	2.1%	5.1%	2.3%	1.3%	3.3%
Half an hour to less than 1	22.8%	19.9%	25.7%	7.5%	5.4%	9.7%	2.7%	1.5%	3.9%	8.4%	6.4%	10.4%	3.9%	2.1%	5.6%	2.4%	1.2%	3.7%
1 hour to less than 2	28.6%	25.7%	31.6%	9.0%	7.0%	11.0%	3.0%	1.8%	4.3%	10.1%	8.1%	12.1%	4.8%	3.3%	6.4%	3.0%	1.9%	4.2%
2 hours to less than 3	31.6%	28.3%	34.8%	9.0%	6.8%	11.2%	3.6%	2.4%	4.8%	11.7%	9.3%	14.1%	5.6%	3.7%	7.4%	3.4%	2.0%	4.8%
3 hours to less than 5	33.9%	30.8%	37.1%	8.8%	6.8%	10.9%	2.9%	1.6%	4.1%	10.7%	8.3%	13.0%	5.8%	4.2%	7.5%	3.7%	2.3%	5.1%
5 hours to less than 7	33.5%	29.3%	37.8%	11.6%	8.0%	15.3%	3.8%	1.9%	5.8%	12.6%	9.1%	16.1%	6.9%	4.0%	9.8%	5.2%	3.1%	7.3%
7 hours or more	37.4%	33.2%	41.6%	9.5%	6.4%	12.5%	4.5%	2.3%	6.6%	13.3%	9.0%	17.6%	9.5%	6.5%	12.4%	5.7%	3.3%	8.1%
Age 14: Organised activities (youth clubs/scouts/girl guides or other)																		
Most days	29.2%	25.8%	32.5%	7.8%	5.6%	10.0%	3.2%	1.9%	4.5%	9.9%	7.7%	12.2%	5.4%	3.4%	7.3%	3.3%	1.9%	4.7%
At least once a week	27.5%	25.3%	29.7%	8.7%	7.1%	10.4%	3.1%	2.2%	4.1%	8.7%	7.2%	10.3%	5.0%	3.8%	6.3%	3.1%	2.2%	3.9%
At least once a month	29.1%	24.1%	34.1%	9.3%	6.1%	12.5%	3.2%	1.3%	5.2%	11.0%	7.6%	14.4%	5.4%	2.6%	8.3%	3.2%	1.4%	5.0%
Several times a year	29.3%	24.3%	34.2%	8.6%	5.3%	11.8%	2.6%	0.8%	4.4%	10.5%	6.9%	14.2%	4.9%	2.2%	7.7%	4.0%	1.8%	6.2%
Once a year or less	27.1%	23.0%	31.3%	9.2%	6.2%	12.1%	2.8%	1.3%	4.4%	10.3%	7.1%	13.5%	4.9%	2.5%	7.3%	3.6%	1.9%	5.3%
Never or almost never	26.1%	24.3%	27.9%	8.7%	7.4%	10.1%	2.9%	2.2%	3.7%	9.5%	8.1%	10.9%	5.2%	4.0%	6.3%	3.4%	2.7%	4.2%

Table D10: Prevalence of offences at age 17 by substance use at age 14

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Age 14: Alcohol frequency in past month																		
Never	24.2%	22.9%	25.6%	6.9%	6.0%	7.8%	2.5%	2.0%	3.0%	7.7%	6.8%	8.6%	4.6%	3.8%	5.3%	2.7%	2.2%	3.2%
1-2 times	33.0%	30.2%	35.8%	12.3%	10.0%	14.5%	3.3%	2.2%	4.4%	12.8%	10.5%	15.1%	5.8%	4.1%	7.5%	4.4%	3.0%	5.7%
3 or more times	46.3%	41.2%	51.5%	19.9%	15.6%	24.2%	7.5%	4.2%	10.8%	22.7%	18.0%	27.5%	9.6%	6.3%	12.9%	7.9%	5.1%	10.8%
Age 14: Binge drinking in past year																		
No	25.2%	23.9%	26.4%	7.6%	6.7%	8.4%	2.5%	2.1%	3.0%	8.2%	7.4%	9.1%	4.6%	4.0%	5.3%	2.9%	2.4%	3.4%
Yes	45.0%	40.4%	49.5%	18.6%	14.8%	22.3%	7.0%	4.6%	9.5%	21.4%	17.4%	25.4%	9.4%	6.3%	12.5%	7.4%	5.2%	9.6%
Age 14: Regular smoker																		
No	26.6%	25.4%	27.8%	8.3%	7.4%	9.2%	2.8%	2.3%	3.3%	9.0%	8.1%	9.8%	4.9%	4.2%	5.5%	3.1%	2.6%	3.6%
Yes	45.2%	36.4%	54.0%	21.1%	14.2%	28.0%	9.8%	3.4%	15.8%	28.2%	19.8%	36.6%	13.5%	7.2%	19.8%	10.5%	5.0%	16.0%
Age 14: Tried cannabis ever																		
No	25.9%	24.7%	27.1%	7.8%	7.0%	8.6%	2.6%	2.1%	3.0%	8.4%	7.6%	9.2%	4.7%	4.0%	5.4%	2.9%	2.4%	3.4%
Yes	48.0%	41.3%	54.6%	22.8%	17.2%	28.3%	9.6%	5.4%	13.7%	28.4%	22.4%	34.4%	12.1%	6.9%	17.3%	10.1%	6.4%	13.8%
Age 14: Tried hard drugs ever																		
No	26.9%	25.7%	28.1%	8.4%	7.5%	9.4%	2.9%	2.4%	3.4%	9.2%	8.4%	10.1%	5.0%	4.3%	5.6%	3.3%	2.8%	3.7%
Yes	53.5%	37.3%	69.7%	27.8%	15.1%	40.5%	12.1%	1.1%	23.2%	38.8%	23.9%	53.7%	18.4%	5.8%	31.0%	11.4%	2.2%	20.5%

Table D11: Prevalence of offences at age 17 by offending behaviours at age 14

	Age 17: Assault			Age 17: Shoplifting			Age 17: Neighbourhood crime (breaking and entering, vehicle crime, theft from person			Age 17: Criminal damage and arson (graffiti, vandalism, fire setting)			Age 17: Cybercrime (hacking/virus)			Age 17: Online bullying, harassment		
	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max	Prev	CI_min	CI_max
Age 14: Weapon carrying/use																		
No	26.1%	24.9%	27.4%	8.1%	7.2%	9.0%	2.7%	2.2%	3.2%	8.7%	7.9%	9.5%	4.6%	3.9%	5.2%	3.0%	2.6%	3.5%
Yes	55.3%	48.3%	62.3%	24.1%	17.1%	31.2%	11.1%	5.6%	16.6%	32.9%	25.0%	40.9%	19.3%	13.5%	25.2%	11.8%	7.2%	16.3%
Age 14: Assault																		
No	16.7%	15.5%	18.0%	6.3%	5.5%	7.1%	1.9%	1.4%	2.4%	6.2%	5.4%	7.0%	3.6%	2.9%	4.3%	2.1%	1.7%	2.6%
Yes	49.7%	47.4%	52.0%	13.8%	11.9%	15.8%	5.3%	4.2%	6.5%	16.9%	14.9%	18.8%	8.5%	6.8%	10.1%	6.0%	4.8%	7.2%
Age 14: Shoplifting																		
No	26.1%	25.0%	27.3%	7.6%	6.8%	8.5%	2.7%	2.2%	3.1%	8.5%	7.7%	9.4%	4.7%	4.0%	5.3%	3.0%	2.5%	3.5%
Yes	52.1%	46.0%	58.2%	33.3%	27.1%	39.5%	11.0%	6.2%	15.7%	34.1%	27.4%	40.7%	16.0%	10.6%	21.3%	11.8%	7.2%	16.5%
Age 14: Neighbourhood crime (breaking and entering, theft from person)																		
No	26.8%	25.6%	28.0%	8.4%	7.5%	9.2%	2.9%	2.4%	3.4%	9.2%	8.3%	10.0%	4.8%	4.2%	5.5%	3.2%	2.7%	3.7%
Yes	52.8%	41.0%	64.5%	28.5%	17.9%	39.1%	11.5%	3.9%	19.1%	34.7%	22.8%	46.6%	24.3%	13.9%	34.6%	14.0%	6.7%	21.4%
Age 14: Criminal damage (graffiti, vandalism)																		
No	25.7%	24.6%	26.9%	7.8%	6.9%	8.7%	2.6%	2.2%	3.1%	8.2%	7.4%	9.0%	4.6%	3.9%	5.2%	3.0%	2.5%	3.4%
Yes	51.6%	45.2%	58.0%	23.6%	18.4%	28.9%	9.4%	5.4%	13.5%	32.8%	26.5%	39.2%	14.8%	9.9%	19.7%	9.9%	6.6%	13.2%
Age 14: Cybercrime (hacking/virus)																		
No	26.0%	24.8%	27.2%	8.0%	7.1%	8.8%	2.6%	2.1%	3.1%	8.5%	7.7%	9.3%	4.3%	3.6%	4.9%	2.9%	2.4%	3.4%
Yes	47.9%	41.7%	54.2%	21.0%	15.8%	26.2%	9.8%	6.1%	13.5%	27.9%	22.6%	33.2%	19.7%	14.3%	25.1%	10.9%	7.6%	14.2%
Age 14: Total number of offending types (out of 6 possible)																		
None	15.9%	14.7%	17.2%	5.5%	4.7%	6.2%	1.6%	1.2%	2.1%	5.3%	4.5%	6.1%	3.1%	2.4%	3.7%	1.9%	1.5%	2.3%
One	44.2%	41.7%	46.7%	10.7%	8.9%	12.5%	3.6%	2.6%	4.7%	12.2%	10.4%	14.1%	6.2%	4.7%	7.7%	4.2%	3.2%	5.2%
Two	51.9%	46.1%	57.6%	21.4%	16.5%	26.3%	9.1%	5.9%	12.4%	25.1%	20.2%	30.1%	12.3%	7.9%	16.7%	8.3%	5.4%	11.2%
Three or more	59.2%	52.5%	65.9%	29.0%	22.1%	35.9%	12.0%	6.4%	17.6%	38.7%	31.0%	46.5%	21.3%	14.8%	27.8%	14.5%	9.7%	19.2%

Age 14: Ever a gang member																		
No	26.4%	25.1%	27.6%	8.3%	7.4%	9.2%	2.8%	2.3%	3.2%	8.9%	8.0%	9.7%	4.8%	4.1%	5.4%	3.0%	2.5%	3.5%
Yes	46.7%	38.9%	54.4%	18.2%	12.3%	24.2%	8.5%	4.0%	13.0%	26.0%	19.3%	32.7%	13.4%	7.6%	19.3%	11.6%	6.6%	16.5%

Appendix E: Prediction models for other offences at age 17

Table E1: Predictors of assault at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**2.70*** **	**2.70*** **	**2.71*** **	**2.57*** **	**2.88*** **	**2.89*** **	**2.85*** **	**2.81*** **	**2.82*** **	**2.17*** **
Oldest child in household	1.01	1.02	1.00	1.02	1.02	1.05	1.05	1.06	1.06	1.06
Cohort member age in months at age 17 survey	0.99	0.99	0.99	0.99	0.99	0.99+	**0.98***	**0.98***	**0.98***	**0.98***
Ethnicity (ref. White)										
Mixed	1.47*	**1.43***	1.33+	1.34+	1.35+	1.37+	1.35+	1.33+	1.41+	1.32
Indian	0.88	0.88	0.97	1.00	1.05	1.11	1.19	1.18	1.35	1.23
Pakistani and Bangladeshi	**0.73***	**0.69***	0.83	0.89	0.95	1.01	1.06	1.06	1.23	1.05
Black or Black British	1.26	1.23	1.25	1.30	1.38+	**1.45***	**1.48***	**1.45***	**1.59****	1.29
Other Ethnic group (incl. Chinese)	1.05	1.01	1.10	1.18	1.21	1.29	1.36	1.33	1.51	1.41
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		1.10	0.88	0.84	0.83	0.82	0.79+	0.77+	0.81	0.82
20-40%		1.12	0.96	0.93	0.91	0.91	0.87	0.86	0.88	0.89
40-60%		0.91	0.83+	**0.82***	**0.81***	**0.81***	**0.78****	**0.78****	**0.79***	**0.79***
60-80% highest		1.10	0.88	0.84	0.83	0.82	0.79+	0.77+	0.81	0.82
FAMILY ENVIRONMENT										
Breastfed			1.01	1.03	1.01	1.01	1.04	1.04	1.02	1.02
Mother smoked during pregnancy			1.09	1.07	1.06	1.01	1.00	1.00	0.98	1.01
Parent-child relationship (parent reported) age 3 [a]			1.00	1.06	1.05	1.05	1.05	1.05	1.05	1.04
Main parent mental health problems (9mths-11yrs) [a]			1.02	1.03	1.02	1.02	1.02	1.01	1.01	1.01
Domestic abuse between parents (9mths-11yrs)			**1.23****	**1.22****	**1.21****	**1.18***	**1.18***	**1.18***	**1.15***	1.13
Main parent used recreational drugs (age 3,5 or 14)			**1.46****	**1.46****	**1.41***	1.31+	1.31+	1.29+	1.28	1.20
Ever single parent between 9mths and 11yrs			**1.21***	**1.19***	1.18+	1.14	1.12	1.11	1.09	1.07
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				**1.23*** **	**1.21*** **	**1.18*** **	**1.16*** **	**1.15****	**1.13****	1.09+
Childhood internalising problems (age 3-11) [a]				**0.87****	**0.87****	**0.88***	**0.90***	0.90+	0.90+	0.91
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**1.87*** **	**1.62*** **	**1.55*** **	**1.52*** **	**1.35*** **	1.20+
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**1.97*** **	**1.84*** **	**1.78*** **	**1.55*** **	**1.32***

Two or three types of substances	**2.37*** **	**2.18*** **	**1.85*** **	**1.64****	1.17
SOCIAL MEDIA AND GAMING AT AGE 14					
Age 14: Social media time use [b]		**1.71*** **	**1.66*** **	**1.46****	**1.29***
Age 14: Computer/electronic gaming time use [b]		**1.39****	**1.40****	**1.38***	**1.30***
SCHOOL FACTORS					
Five A to C GCSEs			1.04	1.03	0.99
School exclusion in secondary between age 11 and 14			1.34+	1.31+	1.12
Persistent truancy (more than just the once) past year at age 14			1.31+	1.24	0.98
PEER FACTORS AT AGE 14					
Age 14: Spending time with friends in leisure time on most days				0.98	0.95
Age 14: Victim of peer bullying				**1.34*** **	1.12+
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)					
One type of substance				**1.35****	1.21+
Two or three types of substances				**1.62*** **	**1.28****
OFFENDING BEHAVIOURS AT AGE 14					
Age 14: Weapon carrying/use					1.15
Age 14: Assault					**3.37*** **
Age 14: Shoplifting					1.19
Age 14: Neighbourhood crime (breaking and entering, theft from person)					0.93
Age 14: Criminal damage (graffiti, vandalism)					1.20
Age 14: Cybercrime (hacking/virus)					1.32+
Age 14: Gang member ever					1.11

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table E2: Predictors of shoplifting at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**1.46*** **	**1.46*** **	**1.46*** **	**1.41*** **	**1.63*** **	**1.62*** **	**1.75*** **	**1.72*** **	**1.69*** **	**1.45***
Oldest child in household	0.99	1.01	0.98	1.00	1.00	1.04	1.04	1.05	1.04	1.04
Cohort member age in months at age 17 survey	1.02	1.01	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01
Ethnicity (ref. White)										
Mixed	1.43	1.37	1.23	1.25	1.26	1.28	1.26	1.27	1.33	1.27
Indian	0.49+	0.48+	0.52	0.54	0.57	0.62	0.62	0.63	0.71	0.68
Pakistani and Bangladeshi	**0.36*** **	**0.32*** **	**0.39** **	**0.42** **	**0.46***	**0.50***	**0.50***	**0.51***	0.59+	0.56+
Black or Black British	1.07	1.01	0.99	1.02	1.12	1.20	1.18	1.19	1.30	1.19
Other Ethnic group (incl. Chinese)	0.92	0.88	0.90	0.96	1.01	1.09	1.09	1.10	1.26	1.10
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		1.28	0.96	0.97	0.95	0.94	0.94	0.91	0.93	0.93
20-40%		1.22	1.00	1.01	0.98	0.97	0.97	0.96	0.96	0.97
40-60%		1.16	1.04	1.05	1.04	1.04	1.04	1.04	1.04	1.05
60-80% highest		1.01	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.96
FAMILY ENVIRONMENT										
Breastfed			1.06	1.07	1.04	1.05	1.05	1.07	1.07	1.05
Mother smoked during pregnancy			0.99	0.98	0.96	0.90	0.90	0.90	0.88	0.90
Parent-child relationship (parent reported) age 3 [a]			1.00	1.03	1.02	1.02	1.02	1.01	1.01	1.00
Main parent mental health problems (9mths-11yrs) [a]			1.07	1.10	1.09	1.09	1.09	1.09	1.08	1.10
Domestic abuse between parents (9mths-11yrs)			1.13	1.12	1.12	1.08	1.08	1.08	1.06	1.04
Main parent used recreational drugs (age 3,5 or 14)			**1.76** **	**1.76** **	**1.67***	**1.52***	**1.53***	1.51+	1.49+	1.49+
Ever single parent between 9mths and 11yrs			1.24+	1.23+	1.22	1.16	1.15	1.13	1.11	1.09
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				**1.16***	1.13+	1.08	1.08	1.06	1.04	1.03
Childhood internalising problems (age 3-11) [a]				**0.84** **	**0.83** **	**0.86***	**0.87***	**0.86***	**0.87***	0.87+
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**2.14*** **	**1.77*** **	**1.75*** **	**1.70*** **	**1.56** **	**1.42***
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**2.00*** **	**1.92*** **	**1.85*** **	**1.55** **	1.32
Two or three types of substances						**2.75*** **	**2.57*** **	**2.12** **	**1.71***	1.03
SOCIAL MEDIA AND GAMING AT AGE 14										
Age 14: Social media time use [b]							1.34	1.30	1.08	1.01
Age 14: Computer/electronic gaming time use [b]							0.88	0.88	0.87	0.82

SCHOOL FACTORS			
Five A to C GCSEs	0.91	0.91	0.88
School exclusion in secondary between age 11 and 14	1.10	1.05	0.98
Persistent truancy (more than just the once) past year at age 14	1.47+	1.41	1.06
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days		1.13	1.11
Age 14: Victim of peer bullying		1.16	1.06
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance		1.22	1.17
Two or three types of substances		**1.77*** **	**1.55** **
OFFENDING BEHAVIOURS AT AGE 14			
Age 14: Weapon carrying/use			1.21
Age 14: Assault			**1.44** **
Age 14: Shoplifting			**2.71*** **
Age 14: Neighbourhood crime (breaking and entering, theft from person)			1.26
Age 14: Criminal damage (graffiti, vandalism)			1.30
Age 14: Cybercrime (hacking/virus)			**1.49***
Age 14: Gang member ever			0.78

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table E3: Predictors of neighbourhood crime at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**1.85*** **	**1.85*** **	**1.80** **	**1.68** **	**1.93*** **	**1.91*** **	**1.77***	**1.67***	**1.66***	1.39
Oldest child in household	0.89	0.90	0.83	0.84	0.84	0.88	0.88	0.89	0.89	0.89
Cohort member age in months at age 17 survey	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.00	1.00	1.00
Ethnicity (ref. White)										
Mixed	1.63	1.56	1.38	1.40	1.41	1.44	1.45	1.47	1.53	1.42
Indian	0.28	0.28	0.33	0.34	0.36	0.40	0.40	0.43	0.46	0.44
Pakistani and Bangladeshi	0.51+	0.46+	0.61	0.65	0.71	0.78	0.79	0.83	0.92	0.85
Black or Black British	**1.86***	1.76+	1.74	1.82+	**1.97***	**2.16***	**2.21***	**2.31***	**2.45***	**2.30***
Other Ethnic group (incl. Chinese)	0.45	0.42	0.48	0.51	0.54	0.58	0.59	0.63	0.68	0.60
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		1.24	0.78	0.73	0.72	0.71	0.70	0.63	0.65	0.66
20-40%		1.07	0.77	0.74	0.73	0.72	0.71	0.67	0.69	0.70
40-60%		1.04	0.88	0.85	0.84	0.85	0.84	0.83	0.84	0.86
60-80% highest		0.94	0.88	0.87	0.86	0.86	0.85	0.86	0.87	0.86
FAMILY ENVIRONMENT										
Breastfed			1.17	1.20	1.17	1.18	1.18	1.22	1.21	1.21
Mother smoked during pregnancy			1.17	1.14	1.12	1.04	1.04	1.03	1.03	1.03
Parent-child relationship (parent reported) age 3 [a]			0.87+	0.94	0.93	0.93	0.93	0.92	0.91	0.91
Main parent mental health problems (9mths-11yrs) [a]			1.00	1.00	0.99	0.99	0.99	0.99	0.98	1.00
Domestic abuse between parents (9mths-11yrs)			1.20	1.19	1.18	1.13	1.13	1.13	1.12	1.09
Main parent used recreational drugs (age 3,5 or 14)			1.50	1.50	1.44	1.28	1.27	1.24	1.24	1.22
Ever single parent between 9mths and 11yrs			**1.53***	**1.51***	1.50+	1.39	1.39	1.35	1.34	1.32
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				1.26*	1.23+	1.17	1.16	1.09	1.08	1.06
Childhood internalising problems (age 3-11) [a]				0.89	0.89	0.92	0.92	0.91	0.91	0.92
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**2.03*** **	**1.61***	**1.61***	**1.55***	1.42+	1.27
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**2.06** **	**2.09** **	**1.96***	**1.78***	1.53
Two or three types of substances						**3.14*** **	**3.25*** **	**2.38***	**2.19***	1.39
SOCIAL MEDIA AND GAMING AT AGE 14										
Age 14: Social media time use [b]							0.92	0.89	0.83	0.75

Age 14: Computer/electronic gaming time use [b]	1.25	1.26	1.24	1.12
SCHOOL FACTORS				
Five A to C GCSEs		0.72	0.71+	0.69+
School exclusion in secondary between age 11 and 14		1.36	1.33	1.27
Persistent truancy (more than just the once) past year at age 14		1.53	1.48	1.12
PEER FACTORS AT AGE 14				
Age 14: Spending time with friends in leisure time on most days			1.03	1.02
Age 14: Victim of peer bullying			1.30	1.17
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)				
One type of substance			1.14	1.08
Two or three types of substances			1.32	1.13
OFFENDING BEHAVIOURS AT AGE 14				
Age 14: Weapon carrying/use				1.33
Age 14: Assault				**1.62***
Age 14: Shoplifting				1.46
Age 14: Neighbourhood crime (breaking and entering, theft from person)				1.05
Age 14: Criminal damage (graffiti, vandalism)				1.18
Age 14: Cybercrime (hacking/virus)				**2.11****
Age 14: Gang member ever				0.99

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table E4: Predictors of criminal damage and arson at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**2.07*** **	**2.08*** **	**2.08*** **	**1.94*** **	**2.19*** **	**2.19*** **	**2.16*** **	**2.10*** **	**2.06*** **	**1.69*** **
Oldest child in household	0.92	0.95	0.92	0.93	0.93	0.97	0.97	0.98	0.98	0.98
Cohort member age in months at age 17 survey	1.01	1.01	1.01	1.02	1.02	1.01	1.01	1.01	1.01	1.00
Ethnicity (ref. White)										
Mixed	1.31	1.20	1.09	1.10	1.11	1.13	1.13	1.12	1.19	1.12
Indian	0.51+	0.50+	0.58	0.60	0.63	0.68	0.71	0.72	0.85	0.79
Pakistani and Bangladeshi	**0.36*** **	**0.29*** **	**0.39*** **	**0.41*** **	**0.45** **	**0.48** **	**0.50** **	**0.51** **	0.61+	**0.55***
Black or Black British	0.80	0.72	0.75	0.79	0.84	0.92	0.93	0.93	1.04	0.94
Other Ethnic group (incl. Chinese)	0.77	0.69	0.80	0.86	0.89	0.96	0.98	0.99	1.17	1.02
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		**1.73** **	1.16	1.07	1.06	1.05	1.02	0.97	0.98	1.01
20-40%		**1.51** **	1.14	1.09	1.07	1.06	1.03	1.01	1.01	1.03
40-60%		1.19	1.03	0.99	0.98	0.99	0.97	0.97	0.96	0.99
60-80% highest		1.15	1.09	1.06	1.06	1.06	1.05	1.05	1.04	1.03
FAMILY ENVIRONMENT										
Breastfed			0.93	0.96	0.93	0.94	0.95	0.96	0.96	0.95
Mother smoked during pregnancy			1.08	1.06	1.05	0.97	0.97	0.96	0.94	0.95
Parent-child relationship (parent reported) age 3 [a]			0.98	1.07	1.06	1.06	1.06	1.05	1.05	1.04
Main parent mental health problems (9mths-11yrs) [a]			1.02	1.01	1.00	1.01	1.01	1.00	1.00	1.02
Domestic abuse between parents (9mths-11yrs)			1.23+	1.21+	1.21+	1.15	1.15	1.15	1.13	1.11
Main parent used recreational drugs (age 3,5 or 14)			**1.72** **	**1.73** **	**1.67** **	**1.50***	**1.50***	1.48+	1.44+	1.40
Ever single parent between 9mths and 11yrs			**1.33***	**1.32***	**1.30***	1.23	1.21	1.19	1.16	1.13
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				**1.27*** **	**1.25*** **	**1.19** **	**1.18***	1.15+	1.12+	1.11
Childhood internalising problems (age 3-11) [a]				0.91	0.90	0.93	0.94	0.94	0.96	0.96
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**1.89*** **	**1.51** **	**1.47***	**1.42***	1.31+	1.15
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**1.97*** **	**1.90*** **	**1.82*** **	**1.47***	1.19
Two or three types of substances						**3.41*** **	**3.26*** **	**2.60*** **	**2.02** **	1.10
SOCIAL MEDIA AND GAMING AT AGE 14										
Age 14: Social media time use [b]							1.31	1.27	0.99	0.89
Age 14: Computer/electronic gaming time use [b]							1.19	1.20	1.20	1.11

SCHOOL FACTORS			
Five A to C GCSEs	0.92	0.93	0.90
School exclusion in secondary between age 11 and 14	1.29	1.22	1.13
Persistent truancy (more than just the once) past year at age 14	1.46+	1.40+	0.97
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days		1.22	1.19
Age 14: Victim of peer bullying		1.14	1.02
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance		**1.38***	1.30+
Two or three types of substances		**2.02*****	**1.70****
OFFENDING BEHAVIOURS AT AGE 14			
Age 14: Weapon carrying/use			1.39
Age 14: Assault			**1.68*****
Age 14: Shoplifting			**1.75***
Age 14: Neighbourhood crime (breaking and entering, theft from person)			1.22
Age 14: Criminal damage (graffiti, vandalism)			**1.83****
Age 14: Cybercrime (hacking/virus)			**1.93*****
Age 14: Gang member ever			0.97

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table E5: Predictors of cybercrime at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**1.74*** **	**1.74*** **	**1.73*** **	**1.65*** **	**1.87*** **	**1.86*** **	**1.63** **	**1.56** **	**1.56** **	1.29
Oldest child in household	1.02	1.05	1.04	1.04	1.04	1.06	1.07	1.08	1.08	1.08
Cohort member age in months at age 17 survey	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Ethnicity (ref. White)										
Mixed	1.08	1.01	0.99	1.00	1.00	1.01	1.02	0.99	1.01	0.90
Indian	0.53	0.52	0.57	0.57	0.61	0.64	0.70	0.70	0.74	0.70
Pakistani and Bangladeshi	**0.45***	**0.38** **	**0.45***	**0.46***	0.49+	0.52+	0.56	0.56	0.60	0.53
Black or Black British	1.05	0.96	0.99	1.02	1.10	1.16	1.22	1.19	1.23	1.16
Other Ethnic group (incl. Chinese)	0.37	0.34	0.38	0.40	0.41	0.43	0.46	0.45	0.47	0.39
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		1.51+	1.09	1.00	0.99	0.98	0.92	0.87	0.88	0.91
20-40%		1.29	1.02	0.96	0.95	0.94	0.89	0.87	0.88	0.92
40-60%		1.13	1.00	0.96	0.95	0.96	0.91	0.91	0.92	0.96
60-80% highest		1.05	0.99	0.97	0.97	0.96	0.94	0.94	0.94	0.94
FAMILY ENVIRONMENT										
Breastfed			0.88	0.90	0.88	0.88	0.90	0.90	0.90	0.91
Mother smoked during pregnancy			1.00	0.98	0.97	0.93	0.92	0.92	0.91	0.88
Parent-child relationship (parent reported) age 3 [a]			0.97	1.05	1.04	1.04	1.03	1.03	1.03	1.03
Main parent mental health problems (9mths-11yrs) [a]			1.07	1.04	1.02	1.02	1.02	1.02	1.02	1.06
Domestic abuse between parents (9mths-11yrs)			1.27	1.26	1.25	1.22	1.22	1.21	1.20	1.17
Main parent used recreational drugs (age 3,5 or 14)			0.92	0.92	0.88	0.81	0.81	0.78	0.78	0.76
Ever single parent between 9mths and 11yrs			1.29	1.27	1.26	1.21	1.19	1.17	1.16	1.14
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				1.16	1.14	1.10	1.09	1.05	1.04	1.02
Childhood internalising problems (age 3-11) [a]				1.02	1.02	1.04	1.05	1.05	1.05	1.06
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**1.95*** **	**1.70** **	**1.64** **	**1.60***	**1.53***	1.30
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**1.62***	**1.56***	1.49+	1.39	1.12
Two or three types of substances						**2.11***	**2.08***	1.65	1.54	0.79
SOCIAL MEDIA AND GAMING AT AGE 14										
Age 14: Social media time use [b]							1.35	1.28	1.20	1.07
Age 14: Computer/electronic gaming time use [b]							**1.84***	**1.88***	**1.87***	1.65+

SCHOOL FACTORS			
Five A to C GCSEs	1.03	1.03	0.99
School exclusion in secondary between age 11 and 14	1.66+	1.64+	1.58
Persistent truancy (more than just the once) past year at age 14	1.27	1.24	0.80
PEER FACTORS AT AGE 14			
Age 14: Spending time with friends in leisure time on most days		0.97	0.96
Age 14: Victim of peer bullying		1.07	0.95
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)			
One type of substance		1.13	1.07
Two or three types of substances		1.30	1.10
OFFENDING BEHAVIOURS AT AGE 14			
Age 14: Weapon carrying/use			**1.84***
Age 14: Assault			**1.49***
Age 14: Shoplifting			1.31
Age 14: Neighbourhood crime (breaking and entering, theft from person)			1.75
Age 14: Criminal damage (graffiti, vandalism)			1.29
Age 14: Cybercrime (hacking/virus)			**3.18*****
Age 14: Gang member ever			1.06

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

Table E6: Predictors of online bullying and harassment at age 17: results of multivariate logistic regression (whole sample, N=13,277)

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR	Model 10 OR
INDIVIDUAL CHARACTERISTICS										
Male	**1.40***	**1.40***	**1.39***	1.31+	**1.49***	**1.47***	1.43+	1.38+	1.37+	1.12
Oldest child in household	0.99	1.01	0.98	0.97	0.97	1.01	1.02	1.02	1.01	1.00
Cohort member age in months at age 17 survey	1.00	1.00	1.00	1.01	1.01	1.00	1.00	1.00	1.00	1.00
Ethnicity (ref. White)										
Mixed	0.78	0.72	0.64	0.64	0.64	0.65	0.64	0.63	0.67	0.60
Indian	0.65	0.64	0.79	0.79	0.84	0.90	1.02	1.04	1.17	1.11
Pakistani and Bangladeshi	**0.36****	**0.30****	**0.43***	**0.44***	0.48+	0.51+	0.56	0.57	0.66	0.59
Black or Black British	1.24	1.12	1.27	1.32	1.43	1.54	1.58	1.57	1.70	1.55
Other Ethnic group (incl. Chinese)	0.84	0.76	0.87	0.91	0.94	1.01	1.10	1.12	1.22	1.08
FAMILY SOCIOECONOMICS										
Household income weekly (average 9mths to age 11) (ref. 80-100% highest)										
20% lowest		1.45	1.02	0.93	0.92	0.91	0.83	0.78	0.81	0.81
20-40%		1.26	0.99	0.93	0.92	0.91	0.84	0.82	0.83	0.84
40-60%		0.97	0.85	0.82	0.81	0.81	0.76	0.76	0.77	0.78
60-80% highest		0.95	0.92	0.90	0.89	0.89	0.86	0.86	0.87	0.87
FAMILY ENVIRONMENT										
Breastfed			1.01	1.03	1.01	1.01	1.05	1.07	1.05	1.05
Mother smoked during pregnancy			1.39+	1.37	1.36	1.27	1.25	1.24	1.23	1.24
Parent-child relationship (parent reported) age 3 [a]			0.95	1.02	1.02	1.01	1.01	1.00	1.00	0.99
Main parent mental health problems (9mths-11yrs) [a]			0.98	0.95	0.94	0.94	0.94	0.94	0.93	0.95
Domestic abuse between parents (9mths-11yrs)			1.35+	1.34	1.34	1.29	1.29	1.28	1.26	1.23
Main parent used recreational drugs (age 3,5 or 14)			**1.99***	**2.01***	**1.92***	1.76+	**1.76***	1.73+	1.73+	1.72+
Ever single parent between 9mths and 11yrs			1.13	1.12	1.11	1.05	1.01	1.00	0.99	0.97
CHILDHOOD MENTAL HEALTH										
Childhood externalising problems (age 3-11) [a]				1.18	1.16	1.11	1.08	1.04	1.02	0.99
Childhood internalising problems (age 3-11) [a]				1.01	1.00	1.03	1.06	1.06	1.06	1.06
ADOLESCENT MENTAL HEALTH										
Age 14: Self-harmed in past year					**1.95*****	**1.62***	**1.50***	**1.50***	1.34	1.15
SUBSTANCE USE AT AGE 14										
Binge drinking, regular smoking, trying cannabis/drugs (ref. none of these)										
One type of substance						**1.66***	1.46	1.42	1.26	1.07
Two or three types of substances						**2.68*****	**2.30****	**2.01***	1.78+	1.06
SOCIAL MEDIA AND GAMING AT AGE 14										
Age 14: Social media time use [b]							**2.59****	**2.53****	**2.32***	**2.10***

Age 14: Computer/electronic gaming time use [b]	1.77+	1.80+	1.74+	1.61
SCHOOL FACTORS				
Five A to C GCSEs		0.91	0.91	0.88
School exclusion in secondary between age 11 and 14		1.51	1.47	1.36
Persistent truancy (more than just the once) past year at age 14		1.03	0.98	0.68
PEER FACTORS AT AGE 14				
Age 14: Spending time with friends in leisure time on most days			1.09	1.07
Age 14: Victim of peer bullying			**1.47***	1.32
Age 14: Peer substance use (alcohol, smoking, drugs) (ref. no substance use)				
One type of substance			1.04	0.97
Two or three types of substances			1.37	1.15
OFFENDING BEHAVIOURS AT AGE 14				
Age 14: Weapon carrying/use				1.30
Age 14: Assault				**1.76****
Age 14: Shoplifting				1.53
Age 14: Neighbourhood crime (breaking and entering, theft from person)				1.33
Age 14: Criminal damage (graffiti, vandalism)				1.00
Age 14: Cybercrime (hacking/virus)				**1.98****
Age 14: Gang member ever				1.61

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Confidence intervals are not shown due to lack of space.

[a] This predictor variable is standardised (z score), meaning that the odds ratio coefficient is for one standard deviation increase in the predictor.

[b] This predictor variable is a ridit score, and the odds ratio coefficient corresponds to differences between those with the highest time use compared to those with the lowest.

The final step (Model 10) includes offending behaviours at age 14, and therefore represents a lagged model, as the same previous behaviour is included as a predictor of current behaviour. Other variables in this lagged model therefore become predictors of *change* between age 14 and 17 and should be interpreted as such.

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