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ACEs, places and inequality: Understanding the effects of adverse childhood experiences and poverty on offending in childhood

Introduction

There is a vast literature on offending in childhood and the factors that cause some children to have an unequal risk of engaging in anti-social and criminal behaviour. For many decades, the pernicious effect of growing up in conditions of poverty has been a fruitful area of study, with strong evidence showing that children who live in poor households or deprived neighbourhoods are more likely to offend. Yet, when faced with the fact that such structural inequalities create the conditions within which offending behaviour flourishes, governments have often struggled to find the policy mechanisms by which to adequately address the problem. In recent years, however, a body of evidence has grown around the relationship between adverse childhood experiences (ACEs) and a range of negative outcomes, including anti-social behaviour and offending. This focus on ACEs has captured the attention of policy makers, not least because it places greater responsibility on families and reduces the apparent burden on governments to solve such problems through less electorally appealing fiscal measures such as higher taxation.

Understanding more about the relative importance of poverty and adversity on childhood outcomes is important, because each one points in the direction of a different set of policy imperatives. However, the existing literature often conflates poverty and adversity in the same narrative and most studies have considered the impact of ACEs on outcomes in adulthood, rather than childhood. Moreover, the debate around ACEs has been controversial and confused, typically relying on a crude metric of the number of types of adversity, rather than examining the impact of different types of adversity.

Using data from a child cohort study based in Scotland, where tackling child poverty and ACEs are both key issues on the policy agenda, this paper seeks to better understand how both adverse experiences and material deprivation influence child offending. To our knowledge, no other studies have examined the complex interaction between poverty and ACEs in the context of offending in childhood, and so this paper makes an original and policy relevant contribution to both criminology and child development literature.

Literature review

Adverse childhood experiences and offending

The original study of adverse childhood experiences (ACEs) by Felitti et al. (1988) used ten questions to calculate a simple adversity score, based on adult recollection of stressful events during the first 18 years of life. Building on psychological and sociological research on the consequences of childhood abuse and household dysfunction, the original items clustered into broad categories: *abuse* (psychological, physical, and sexual); *neglect* (emotional and physical); and *household dysfunction* (substance abuse, parental separation/divorce, mental illness, violent treatment towards the mother, and imprisonment of a family member). Felitti et al. (1988) identified a graded relationship between the number of items reported, and a range of adverse risk factors and health outcomes in adulthood, including smoking, drug and alcohol abuse, obesity, depression, cancer and heart disease, which the researchers broadly ascribe to the damaging social, emotional and cognitive effects of childhood trauma and household dysfunction.

Research has since identified links between exposure to ACEs and other types of inequality, including criminal justice outcomes. For example, Levenson and Socia (2016: 1886) observe that ‘childhood trauma is clearly associated with adult criminality, and among criminal offenders, greater exposure to adverse events is significantly associated with mental health disorders and serious involvement in drugs and crime’. Bellis et al. (2015) found that those with four or more ACEs were 15 times more likely to have committed an act of violence in the last 12 months and 20 times more likely to have been incarcerated at any point, compared with adults with no ACEs. Similarly, Reavis et al. (2013; 14) found that an adult male offender group reported nearly four times as many ACEs than a non-offender sample, concluding that ‘criminal behavior can be added to the host of negative outcomes associated with scores on the ACE Questionnaire’. UK prison surveys report similar findings, with high rates of childhood abuse, family violence, experience of being in care and school exclusion among adult prisoners (Williams et al., 2012; Carnie et al, 2017).

Two limitations of these studies are firstly, that they focus on outcomes in adulthood, and second, rely on retrospective accounts, which risks recall bias (see Hardt and Rutter, 2004). Nevertheless, a growing number of prospective studies have verified a strong link between number of ACEs and likelihood of offending both in childhood and adulthood. For example, Craig et al. (2017) used indicators measured in childhood by the longitudinal Cambridge

Study in Delinquent Development to show that having more ACEs increased the likelihood of offending across the life-course, from age 10 to 56. Using juvenile justice data for Florida, Baglivio et al. (2015) found that exposure to more ACEs predicted both early-onset and chronic offending trajectories between age 7 and 17; while Fox et al. (2015) showed that young people with a higher number of ACEs were more likely to become serious, violent, and chronic offenders by age 35. Similarly, Wolff et al. (2017) reported that a higher exposure to ACEs among adjudicated youth offenders was associated with increased recidivism as measured by speed of re-arrest. The evidence in favour of a causal link between ACEs and both childhood and adult offending is, therefore, considerable.

Whilst the conceptual framework of ACEs has gained academic and policy traction within the last decade, critical perspectives have drawn attention to both methodological and theoretical limitations (see further Davidson et al. 2020). On methodology, Treanor (2019) characterises the check-list approach as deterministic and over-predictive, with experiences as varied as sexual abuse and parental separation given equal weighting, making it impossible to ascertain if some childhood experiences are likely to have a more detrimental impact than others. In relation to criminal justice outcomes, it is likewise impossible to ascertain how established predictors of offending such as parental maltreatment (Loeber and Stouthamer-Loeber 1996; Dennison and Stewart 2001), parental offending (Farrington, 2011) and parental substance abuse (Grekin et al. 2005) interact with one another. White et al. (2019: 258) note the ‘blurring’ within items: for example, parental separation is viewed as an ACE, irrespective of whether the event was amicable or adversarial, or when it occurred. A co-author of Felitti et al.’s original study has cautioned that the numerical approach: ‘is a relatively crude measure of cumulative childhood stress exposure that can vary widely from person to person’; is not standardized; and ‘cannot fully assess the frequency, intensity, or chronicity of exposure to an ACE or account for sex differences or differences in the timing of exposure’ (Anda et al., 2020; 1). The authors also express concern that ‘ACE scores are being misappropriated as a screening or diagnostic tool’ by misassigning population-based health outcome risks to individuals (Ibid: 1).

From a theoretical perspective, researchers have critiqued an overemphasis on individual families and corresponding lack of structural analysis (Kelly-Irving and Delpierre, 2019; Edwards et al. 2019). Davidson and Wright (2020: 541) note how more recent research has focused on biological and neurological factors, further narrowing the theoretical framework. In a striking example of how the ACEs literature overlooks structural conditions, a systematic

literature review by Walsh et al. (2019) found that of 2,285 papers on ACEs, only six fully accounted for the child's socio-economic status. The authors state, 'there has been very little discussion in the political discourse regarding the role of childhood socio-economic position in understanding and addressing them' (2018: 1091). Critics have also highlighted a lack of conceptual clarity. For example, White et al. describe ACEs as a 'chaotic concept that prioritises risk and obscures the material and social conditions of the lives of its objects', and 'conflates different issues'. Similarly, Treanor (2018, 2019) cautions against the oversimplistic repackaging of poverty and inequality as ACEs, and misplaced attribution of structural problems to individual families.

Poverty and offending

Separate from the research on ACEs, there is an extensive and longstanding literature on the pernicious effects of growing up in poverty, and the relationship between childhood offending and material deprivation (Kelly, 2000; Sutherland et al., 2013; Joliffe et al. 2017, Newburn, 2016). Whilst the causal mechanisms and correlates remain unsettled, the association between poverty and offending is clear. As Messner and Rosenfeld (2013: 4) state, 'Whether we look at official statistics on arrest and incarceration, self-report studies of criminal offending, or surveys of crime victims, the same pattern emerges: lower socioeconomic status is associated with greater involvement with the criminal justice system, higher rates of criminal offending, and higher rates of various forms of victimization. The relationship between socioeconomic deprivation and involvement in crime and the justice system holds not only for individuals... but also for neighbourhoods'.

The academic literature on poverty and offending broadly falls into two overlapping strands. The first relates to familial or household level deprivation, defined in terms of a lack of sufficient material resources to meet minimum individual or family needs, often as a result of long-term joblessness. Many studies have found that children growing up in poor households are more likely to offend (Wright et al. 1999; Jarjoura et al. 2002; Galloway and Skardhamar, 2010). Longitudinal studies and life course perspectives show how the likelihood of offending is variously mediated by risk factors and protective factors, and demonstrate the effects of cumulative inequalities. For example, Fergusson et al. (2004: 956) found that higher offending rates among young people from economically disadvantaged families reflected 'a life course process in which adverse family, individual, school, and peer factors combine to increase individual susceptibility to crime'. Demonstrating the impact of sustained material disadvantage, Jarjoura et al. (2002) observe that persistent poverty is a

strong and independent predictor of delinquency, although mediated by factors such as maternal age, parental occupational and educational status. Evidence from childhood cohort studies is particularly persuasive. For example, findings from the Edinburgh Study of Youth Transitions and Crime (ESYTC) showed that poverty had a significant and direct effect on young people's likelihood to engage in violent behaviour at age fifteen. Even when controlling for risk factors associated with violence such as family dysfunction and weak attachment to school, and protective factors such as strong family bonds, those children growing up in unemployed or in low status manual employment households were significantly more likely to engage in violent behaviour (██████████). Similarly the Cambridge Study of Delinquent Development found that low family income and poor housing predicted both self-reported and official offending in juvenile and adults (Farrington, 1995).

With its roots in the Chicago School (Shaw and McKay, 1942), the second body of literature relates to the impact of growing up in a deprived neighbourhood, typically characterised by a high concentration of economically disadvantaged households and significant aspects of social disorganisation, including high crime rates, poor health and low educational achievement. Again, while the causal mechanisms are contested, exposure to neighbourhood deprivation is understood to be a strong and robust predictor of offending in childhood (Messer et al., 2006, Chung et al. 2006). In a five-year case study, Hayden et al. (2007) found that of around 34,000 offences committed by young people aged 17 or younger, the majority were committed by those living in areas of social housing, especially large low-rise municipal estates and areas of inner-city council flats. Fabio et al (2011) found that rates of violence among boys in disadvantaged neighbourhoods rose to higher levels and were sustained for longer periods, compared to boys in more advantaged areas. Miller and Tolan (2018) found that even in the presence of protective social processes and stable, high quality parenting, structural deprivation at the neighbourhood level continued to exert an influence on risk of offending in childhood. Drawing on the Chicago tradition, Sampson et al. (1997; 2002) argue that the capacity to control the behaviour of young people is more limited in deprived neighbourhoods, although mediated by local levels of collective efficacy. Other scholars (Safra et al. 2016, Galán, 2017) have found that neighbourhood deprivation adversely impacts on pro-social behaviour in children at a young age, even when controlling for sex, ethnicity and cognitive ability.

The complex relationship between crime and economic inequality relates in part to the range of potential mediating factors at play, at an individual, family and neighbourhood level (Valdez et al. 2007). Webster and Kingston (2014: 6) describe how poverty impacts on crime ‘through a multiplicity of causal chains and pathways, all of which may singularly have a weak individual influence, but together are associated with experiences of living in poverty’. Amongst the risk factors identified by researchers, there is also an overlap with some of those captured in the ACEs literature. So, while poverty is not just another ACE, the two may have many co-morbidities, with families living in poverty ‘more likely to experience poorer functioning’ as well as conflict, emotional stress, disruption, and breakdown (Ibid.: 32). As Treanor notes, ‘children are more likely to experience adversity in childhood when they also experience poverty and inequality’ (2020: 479). Using data from the Growing Up in Scotland survey, Marryat and Frank (2019) found that children living in low-income Scottish households were far more likely to experience ACEs, and to experience a higher number, compared to children from the most affluent households. Similarly, a large-scale English study found that four or more ACEs were reported by 12.7% of those in the most deprived neighbourhood quintile, compared to 4.3% in the least deprived quintile. Specifically, ‘living with a drug user, parental separation, having a household member incarcerated, and living with an alcohol abuser all increased in prevalence with deprivation and reduced with increasing age. Experience of physical abuse, verbal abuse, or domestic violence within the childhood household was also highest in the most deprived quintiles’ (Bellis et al. 2014; 4).

The debate on the respective effects of ACEs and structural poverty, the relationship between the two, and how governments might best deploy their limited resources to reduce the pernicious impact of inequality, is relevant to a wide range of policy fields, including justice. One of the key policy challenges is disentangling the respective effects of different types of childhood disadvantage, including different manifestations of ‘adversity’ and dimensions of poverty, to identify appropriate policy responses. This same challenge is also directly relevant to youth justice policy, and how to tackle the enduring problem of offending by young people, as discussed next.

Youth offending and justice policy in Scotland

To contextualise how different types of inequality affect the risk of childhood offending in Scotland, it is important to take account of patterns of, and policy responses to, youth crime. Like many other western countries, including the rUK, there has been a substantial crime

drop in Scotland over the last three decades (██████████ 2017). There is strong evidence to suggest that this was largely driven by a reduction in youth offending, as reflected by the substantial fall in referrals to juvenile justice (██████████ 2018) and fewer criminal convictions amongst young adults (Matthews and Minton, 2017). However, ██████████ have demonstrated that the fall in the juvenile justice population also resulted in a ‘concentration effect’ by which child offenders who come to the attention of justice agencies increasingly exhibit extreme vulnerability and come from the most deprived communities. This pattern is not unique to Scotland, for example Bateman (2020) highlights the predominance of vulnerable and deprived children in the criminal justice system in the wake of similar falls in youth offending in England and Wales.

Scottish policy makers have placed both ACEs and child poverty high on the policy agenda, with explicit recognition that ‘ACEs need to be understood in the context of poverty, inequality and discrimination’ (NHS Health Scotland, 2019). Successive Programmes for Government have prioritised tackling child poverty alongside a strong focus on ACEs, and policies such as the Fairer Scotland Action Plan (Scottish Government, 2016) are aimed at breaking ‘the intergenerational cycles of poverty, inequality and deprivation’. This approach is also reflected in the re-framing of youth justice, which has shifted away from the punitive approaches of previous governments to take serious recognition of the degree of vulnerability experienced by children and young people. Underpinned by evidence of the damaging effects of justice system contact (██████████), the Scottish Government has implemented a new Whole Systems Approach¹ to young people who offend, with emphasis on ‘early and effective intervention’ and diversion from prosecution. Recognition of vulnerability in the youth offending context has also sparked a series of ACE-informed strategies, including the introduction of ‘trauma informed’ training in Scottish policing, aimed at increasing officer awareness of ACEs and ‘reducing and mitigating the trauma that policing can cause’ (Scottish Police Authority, 2019: 2-3).

There is, however, a lack of research in Scotland on the offender population in general, and on young offenders. What research does exist was conducted two decades ago, and does not reflect the profile of child offending in the wake of the crime drop. In the absence of such research, it is unclear how the implementation of the Scottish Government’s child poverty strategies and ACE-informed policies might impact on child offending, or which is likely be

¹ Scottish Government Youth Justice Policy: <https://www.gov.scot/policies/youth-justice/whole-system-approach/>

most effective in reducing inequalities of risk. In an era of fiscal austerity, which is likely to increase in the wake of the Coronavirus pandemic, asking questions about where the policy focus should lie in the context of current juvenile justice policies would appear to be imperative.

Research aim and questions

The aim of this paper is to examine the impact of both ACEs and poverty on offending in childhood. More specifically, we examine both the independent and combined effects of ACEs and poverty, and determine whether looking at different types of adversity is more informative than a simple count of ACEs. To address our aim, we pose five research questions:

- 1) Does a higher number of ACEs increase the likelihood of offending behaviour in childhood?
- 2) Does a higher number of ACEs increase the likelihood of childhood offending when taking account of persistent poverty, both in terms of household disadvantage and neighbourhood deprivation?
- 3) Is there evidence of increased inequality in childhood offending amongst those who experience both ACEs and poverty?
- 4) Do ACEs and poverty continue to impact on childhood offending when controlling for other potentially confounding factors?
- 5) Does taking account of the types of ACE matter more than simply counting the number when explaining childhood offending?

Research design, data and methodology

We adopt a quantitative design to disentangle the relative, and combined, importance of specific factors known to be associated with childhood offending. The analysis uses cohort data from ‘Growing Up in Scotland’ (GUS), a nationally representative longitudinal study that tracks the lives of Scottish children through the early years and beyond.² The first sweep took place in 2005/6, when the children were aged 10 months, and involved 5,217 families. Data collection proceeded annually until sweep six (age six), and biannually thereafter,

² For details of the Growing Up in Scotland survey see: <https://growingupinscotland.org.uk/>

capturing data on a range of topics. These include social, cognitive, and behavioural development; health and wellbeing; childcare, education, and parenting; child conduct disorder; and socio-economic status – and from the ninth sweep onward, child offending.

In this paper we use child and parent interview data from sweeps six to nine, which covers a six-year period from age seven to twelve (earlier sweeps did not include the measures required for our analysis). The data are modelled using a series of binary logistic regression models, using different controls and interaction effects, as discussed shortly.

First, we describe the variables in our analysis (also summarised in Table 1). Appendix A provides further information on the variables in the study, including original survey questions and timeframes. Note that the GUS questionnaire design, whereby some questions are asked at only one or two sweeps, precludes consistency across all measures. While most of our ACE variables are collected at sweeps six to nine, parental maltreatment and partner violence are only measured at sweep seven, which could underestimate the extent experienced by the GUS cohort.

Table 1. Variables in the analysis and prevalence

Variable type	Variable description	Prevalence/mean
<i>Dependent variable:</i>	Involvement in offending within the last year (binary)	25.8%
<i>Independent variables:</i>		
Adverse Childhood Experiences (binary)	3 or more ACEs	14%
	ACE Category 1: Parental maltreatment	30.4%
	ACE Category 2: Household dysfunction	25.1%
	ACE Category 3: Family trauma	35.7%
	ACE Category 4: Family offending	3.5%
Household deprivation (ordinal)	No sweeps	69.4%
	One sweep	11.5%
	Two sweeps	5.7%
	Three sweeps	5.4%
	Four sweeps	8.0%
Neighbourhood deprivation (ordinal)	No sweeps	82.7%
	One sweep	3.4%
	Two sweeps	3.6%
	Three sweeps	2.7%
	Four sweeps	7.6%
<i>Control variables:</i>		
Sex (binary)	Male	50.6%
Ethnicity (binary)	White	97.0%
Teen mother (binary)	Aged 19 or under at birth of cohort child	2.0%
General child health (ordinal)	Good or very good	95.2%
	Fair	4.3%
	Poor or very poor	0.6%
Additional support (binary)	Has additional support needs	10%
Cognitive ability (continuous)	Standardized reading score	zero

Dependent variable:

Our outcome of interest is **child offending during the last year** as measured at age twelve. Child offending in GUS is based on nine types of behaviour, including vandalism, graffiti, assault, and public disorder (see Appendix One). The study found that 25.8% of twelve-year olds reported at least one type of offending behaviour within the last year, which varied significantly by sex (33.8% of boys, compared to 17.5% of girls). Our dependent variable is a binary measure, which assigns 12-year olds who reported at least one type of offending during the last year a score of 1, and the others a score of 0.

Independent variables:

(i) Adverse Childhood Experiences (ACEs)

Our ACE measures are based on ten different experiences asked about between the ages of six and twelve. While there is some overlap with Felitti et al.'s original checklist, the questions are not directly comparable, which in part is unavoidable, as GUS does not collect data on some items. Our analysis also includes theoretically relevant items beyond the original checklist, including family bereavement, serious illness, and parental contact with the police.

First, we tested a simple binary measure based on whether a child had **experienced three or more ACEs** at any time between age six and twelve, which applied to 14% of children in the sample. Second, we tested four ACE categories, constructed from the ten individual measures. Again, these do not align with the categories used by Felitti et al. (1988), in part because our component measures are different; however, they do reflect the data collected and fit well with existing literature on the differential nature and causes of childhood adversity. Note also that our aim is to test whether it is more important to measure the *number* of adversities, or differences in *types* of adversity, rather than replicate earlier approaches. Our categories, and the measures used to create them are described below (with the prevalence of each measure in parentheses).

- a) *Parental maltreatment* captures elements of parental neglect and abuse and is based on measures of: (1) the child not feeling loved and supported (16.8%); and (2) the child's experience of corporal punishment or smacking (18.4%).
- b) *Household dysfunction* captures aspects of adversity created by the family environment based on measures of: (3) family mental health problems (8.5%); (4) conflict between parents (12.5%); (5) family drug or alcohol abuse (1.9%); and (6) domestic violence (10.7%).
- c) *Family trauma* captures potential adversity arising from a significant loss or separation, as measured by: (7) the death and/or serious illness of a parent or sibling (16%); and (8) parents separated/divorced (24.9%).
- d) *Family offending* captures the effects of criminal activity by other family members on the child and is measured by: (9) a parent/sibling being in serious trouble with the police (1.4%); and (10) parental imprisonment (0.4%). Note that family offending

questions are answered by the adult respondent, nearly all of whom are mothers, and may be vulnerable to underreporting.

As shown in Table 1, between a quarter and a third of children had experienced parental maltreatment, household dysfunction and family trauma, which suggests that these types of ACE were reasonably common, while family offending was far less prevalent.

(ii) Household poverty and Neighbourhood deprivation

Given the theoretical importance of household socio-economic status and neighbourhood deprivation, we include these as separate explanatory factors. To maintain consistency with the ACE measures, we use data collected from sweeps six to nine only. Household deprivation is an ordinal variable ranging from zero to four, which indicates the number of sweeps that the child's parents (or carers) were unemployed and/or the household was in the lowest equivalised income quintile. Neighbourhood deprivation is also an ordinal variable, ranging from zero to four, which indicates the number of sweeps that the child was resident in a neighbourhood within the highest quintile of the Scottish Index of Multiple Deprivation (SIMD) (i.e. the 20% most deprived). Table 1 shows that just under 1 in 10 of the sample experienced household poverty (8.0%), or neighbourhood deprivation (7.6%), across all four sweeps.

Control variables:

Our main focus is on the effect of ACEs and poverty on childhood offending; however, as noted earlier, a range of other factors are known to affect a child's likelihood of offending. We therefore include several control variables that are known associates of childhood offending, namely: sex, ethnicity, maternal age, general child health, whether the child has additional support needs, and cognitive ability (based on standardized listening skills). Given that these control variables are also likely to have some relationship to our main independent variables (ACEs and poverty) we include them to ensure that we take account of potentially confounding variables. In the analysis section, we only report those that were statistically significant in the models.

Modelling approach

As our dependent variable is binary, we use a logit regression model (Equation 1) to test the effect of our independent variables on childhood offending:

$$\text{Equation 1. } P(OB_i = 1|X) = G(\beta_0 + \beta X)$$

Where G is a logit function taking only values between zero and one, OB denotes offending behaviour, with a value of one for any child who reported involvement in offending. X denotes the independent variables of interest (ACEs, household and neighbourhood deprivation) as well as our control variables.

In a model with a dichotomous dependent variable, we are interested in how the response probability of the dependent variable changes when the independent variables are introduced. The coefficients show the correct sign of the partial effects of each independent variable on the response probability; however, estimation of the magnitude of these effects is achieved by computing the partial derivative, as shown in Equation 2, where the effect of any one independent variable also depends on the values of the other independent variables:³

Equation 2.
$$\frac{\partial P(OB_i=1|X)}{\partial x_i} = g(\beta_0 + \beta X)\beta_i, \text{ where } g(z) = \frac{dG}{dz}(z)^4$$

To address our research questions, we ran two sets of four models. The first set tested the impact on childhood offending of our count measure of ACEs (i.e. three or more ACEs versus less than three); while the second set tested the impact of our four different ACE categories.

Both sets of models are structured as follows. The first model in each set includes our ACEs measure(s) only, to test the effect of ACEs on childhood offending in the absence of other potentially confounding variables. The second model adds the household and neighbourhood deprivation measures, to test whether ACEs continue to significantly explain childhood offending even in the presence of persistent poverty. The third model tests the interaction effect between our ACEs measure and both measures of poverty, to see whether experience of both ACEs and poverty increases inequality in terms of childhood offending. And the final model tests for all of these relationships in the presence of a set of control variables, to take account of other confounding relationships that may be exaggerating the impact of ACEs or poverty on childhood offending. Next we present the key descriptive statistics, before moving onto the main body of regression analysis.

³ We evaluate the effect of the variable of interest based on the average values of other variables.

⁴ For a detailed explanation of partial derivatives in logit models, see Wooldridge, J. (2012) *Introductory Econometrics: a Modern Approach*. Mason, Ohio: South-Western Cengage Learning.

Descriptive analysis

ACEs and Offending

Descriptive analysis indicates a positive relationship between increased exposure to ACEs between age six and twelve and the likelihood of self-reported offending at age 12 ($p = \leq .01$). Figure 1 shows that one in five children who had experienced no ACEs reported at least one type of offending in the last year. This rose to just over one in four children who had experienced 1 or 2 ACEs, and to one in three children who had experienced 3 or more ACEs. In other words, there is a clear incremental relationship between number of ACEs experienced and participation in offending behaviour. Looking at the four ACE categories, the prevalence of offending is slightly higher among those who experienced parental maltreatment (40%), compared to those who experienced family trauma and household dysfunction (both 38%), and family offending (37%). The prevalence of offending among those who did not experience each ACE category, was around 22%.

Figure 1 here.

Household poverty, neighbourhood deprivation and self-reported offending

Figure 2 shows the prevalence of self-reported offending at age 12 according to the number of sweeps that the family experienced household poverty and neighbourhood deprivation, between sweeps six and nine. Taking each in turn, the prevalence of offending is lowest among children who did not experience household poverty, at 23%. While the prevalence of offending is higher amongst those that have experienced household poverty, there is not a clear incremental relationship in terms of the number of sweeps. In other words, *any* experience of household poverty appeared to be as important as that of persistent poverty. There is also a significant relationship between neighbourhood deprivation and offending at age 12. Looking at the cumulative effect of living in the most deprived area, one in four of those who had never lived in an area in the most deprived quintile of the SIMD or had done so for only one sweep reported offending at age 12. This increased to 37% amongst those living in one of the most deprived quintiles for two sweeps, and again to 43% for three sweeps. However, the likelihood of offending amongst those living in most deprived quintile for all four sweeps dropped back to 26%, similar to those who only lived in deprived neighbourhoods for one sweep or less. This is most likely explained by the fact that the distribution of the neighbourhood deprivation measure is quite heavily skewed. While further exploratory analysis is outwith the scope of this paper, it is also possible that the experience

of inconsistent neighbourhood deprivation (i.e. moving in and out of disadvantaged areas over two or three sweeps) may have a greater impact on childhood offending than consistently being exposed to high neighbourhood deprivation.

Figure 2 here.

Results: Regression modelling

Our first research question asked whether children who had experienced a higher number of ACEs were more likely to engage in offending behaviour. To address this, we compare those with 3 or more ACEs (14%), to the rest of the sample. The results from our four models are shown in Table 2.

Table 2 here.

Model 1 substantiates the analysis shown in Figure 2; namely, in the absence of any other influencing factors, having more ACEs between age six and 12 is strongly and positively related to offending at age 12.

Model 2 addresses our second research question; whether having more ACEs influences childhood offending when taking account of childhood poverty at the household and neighbourhood level. This looks at the impact of persistent poverty, using measures that represent the number of sweeps at which the child was living in a household with low income or jobless parents and/or living in one of the 20% most deprived neighbourhoods of Scotland. The coefficients in Model 2 show that, in the presence of our poverty measures, there is no observably significant relationship between our ACEs measure or either type of poverty.

Model 3 addresses our third research question, and includes interaction effects to test whether the likelihood of offending was greater amongst those with more ACEs when also growing up in one or both types of poverty. Here, the ACEs measure becomes significant once more, albeit at a weaker level compared to Model 1, while the poverty measures remain non-significant.

Research question four asked whether the effect of ACEs and our two measures of poverty would continue to exert an influence on offending behaviour when controlling for the confounding effect of other potential influencing factors. While all of the control variables are included in Model 4, we only report on significant effects in Table 2. This shows that, holding ACEs and poverty constant, girls are less likely than boys to be involved in offending

behaviour and that an increase in poor general health is associated with offending. When controlling for these additional control variables, the number of types of ACEs experienced continues to exert a weak but significant influence on childhood offending behaviour, while both types of poverty remain non-significant.

Overall, Table 2 suggests that children growing up with three or more ACEs are at greater risk of offending than those with fewer ACEs and there is no evidence that this is impacted by growing up in poverty. While weakly significant, the fact that the impact of ACEs on self-reported offending at age 12 endures, both in the presence of persistent household and neighbourhood deprivation, and when controlling for a range of other control variables, suggests that experiencing multiple types of adversity does have an impact on problematic behaviour that may, in turn, impact negatively on many other aspects of a child's life. Based on our cumulative measure of ACEs, this would suggest that ACE awareness policies could be valuable in identifying increased risk of childhood offending if they pay particular attention to the breadth of adversities that children experience, and, that such strategies need to be universal and not concentrated in poorer areas. In other words, the findings at this stage lend support to holistic ACE-focused strategies.

What is not clear, given the crude count of ACEs used in the model, is whether particular types of experience are more influential than others. This brings us to research question five: do particular ACEs have an unequal effect on children's behavioural problems than others? Table 3 replicates the analysis in Table 2, with the exception that we replace the number of ACEs with four separate indicators showing the type of ACEs experienced between ages of six and twelve. As before, we show four model specifications, starting with the ACE types then adding the measures of poverty, the interaction terms, and finally the control variables.

Table 3 here.

The findings presented in Table 3 show that different types of ACE, as well as the number, can influence involvement in offending behaviour at age 12. Of the four ACE categories, Model 5 shows that parental maltreatment is the most significant independent predictor of childhood offending. Having a family member with criminal justice experience also acts as significant predictor of childhood offending, while the effect sizes for family trauma and household dysfunction are small and non-significant.

Model 6 introduces our two measures of poverty. This shows that family offending and parental maltreatment continue to be significant in the presence of poverty, albeit with

weaker effect sizes. Consistent with the results in Table 2, there is, however, no significant relationship between our two measures of poverty and childhood offending, in the presence of the four ACE categories.

However, when the interaction effects are introduced in Model 7, growing up in persistent neighbourhood deprivation becomes significant as a main effect, while family offending remains non-significant. Only one interaction effect is significant in Model 7; that between neighbourhood deprivation and parental maltreatment, which is negative. The negative effect suggests that the predicted likelihood of offending is lower than might be expected amongst those living in more deprived neighbourhoods who experienced parental maltreatment – although statistically this may be because their likelihood of offending was already so high it could not increase as much as for other groups.

Finally, model 8 includes our control variables. Again, only the sex of the child and their general health are significant. This reinforces the enduring relationship between being male and childhood offending, as reported by many other studies (see Moffitt et al. 2001) and demonstrates that we are not controlling out the effect of sex with the other variables. Persistent household deprivation remains non-significant, while exposure to persistent neighbourhood deprivation continues to exert a significant influence on childhood offending, even in the presence of other potential causal factors.

While weakened by the addition of the control variables, experiencing parental maltreatment remains the strongest significant predictor of offending at age 12. Conversely, none of the other ACE types are significantly related to childhood offending when considered alongside the other explanatory or control variables. Interestingly, the interaction effect between neighbourhood deprivation and parental maltreatment remains negative and significant in Model 8. This suggests that the impact of parental maltreatment on offending is weaker in the presence of neighbourhood deprivation, and conversely, that the impact is stronger among children who do not live in a deprived area. In other words, for those in deprived neighbourhoods, the effect of parental maltreatment on the risk of childhood offending is counterbalanced and outweighed by the effect of deprivation.

Discussion

An extensive academic literature has shown that those who variously experience ACEs and/or poverty (at a household or a neighbourhood level) are more likely to be involved in offending behaviour. Such evidence is driving a policy focus on both sets of issues within the UK generally, and Scotland specifically. However, there appears to be some confusion about the relationship between ACEs and poverty, and the relative impact of each on children's outcomes, which makes it difficult for policy makers to identify the most appropriate and effective intervention strategies. In this paper, we sought to understand the effect of ACEs and poverty, at both household and neighbourhood level, on the propensity to offend at age 12; and, taking our analysis further, to identify the importance of different types of ACEs rather than focusing crudely on the number. In doing so, we contribute new evidence to the literature around child development, adversity and poverty, and offending.

Our findings suggest that the number of ACEs that young people experience have a significant relationship with their propensity to get involved in early offending. This is true, over and above the effect of persistent family and neighbourhood deprivation and a range of other potentially important causal variables. Based only on this analysis we might have concluded that tackling ACEs was the most important priority in terms of reducing childhood offending, and that reducing poverty was unlikely to have much, if any, additional impact. However, further investigation suggests that the type of ACEs matters, as does the structural context. When modelling the effect of different types of adversity on childhood offending, both familial contact with the criminal justice system and experience of parental maltreatment were influential, whereas household dysfunction (for example, familial drug and alcohol abuse) and family trauma (as a result of loss/separation or illness) were not independently significant. Of the four ACE types, only parental maltreatment remained independently significant in the final model, along with living in persistent neighbourhood deprivation. These findings are respectively consistent with prior academic studies on the relationship between parental maltreatment and childhood offending (see Loeber and Stouthamer-Loeber 1996; Dennison and Stewart 2001), and with existing literature on neighbourhood and offending.

While the strength of the relationship between the number of ACEs and a range of negative outcomes may reinforce the tendency for researchers, and potentially policy makers, to look only at this crude metric, digging beneath the surface shows that not all ACEs carry equal

weight and that a simplistic ACE-aware approach or narrative based only on quantifying the problem may be less helpful than exploring and understanding the impact of specific types of trauma and adversity during the early formative years. Our findings also suggest that the traditional approach to ACEs, based on the ten-point questionnaire, may over-predict the risk of certain outcomes, and overlook others, by including experiences that are unlikely to impact on childhood offending.

Overall, our results give credence to the argument that paying heed to the types of ACEs, as well as the number, experienced in childhood is important, especially in terms of providing a focus for policy and practice. Moreover, they reinforce the argument that ACEs need to be understood in the context of structural poverty (and underscore the need for reliable data to support such analysis). Looking at the latter, even though there appeared to be a clear relationship between persistent household poverty and involvement in childhood offending in the descriptive analysis, this did not hold when ACEs were taken into consideration. This could well be due to a strong underlying connection between ACEs and family poverty, and does not necessarily suggest that growing up in households blighted by low income and family unemployment does not contribute to poor behaviour. It is more likely that these factors contribute, either directly or indirectly, to the child's wider experiences of adversity and, as such, the direct effect of any underlying poverty on their offending outcomes is diluted. This would also align with Webster and Kingston's (2014) conclusion that familial poverty often impacts on youth offending through a multiplicity of pathways and processes. Similarly, Jarjoura et al (2002) found that the effect of persistent poverty on offending was mediated by a range of other factors, although they did not account for ACEs specifically.

In contrast, neighbourhood deprivation played a clear and significant role in explaining childhood offending, albeit only when taking account of different types of ACEs. Others, such as Messer et al. (2006) and Chung et al. (2006) found the effect of neighbourhood deprivation to be overwhelming; however, they did not account for the impact of ACEs. If Safra et al. (2016) and (Galán, 2017) are correct that living in a deprived neighbourhood alters a child's pro-social behavioural processes, it could be that living with certain types of ACEs facilitates this process. We also found that exposure to persistent neighbourhood deprivation increased the risk of offending amongst those who did not experience parental maltreatment, which is in line with Miller and Tolan's (2018) argument that even in the presence of protective factors such as high-quality parenting, structural deprivation at the neighbourhood level can exert an influence on risk of childhood offending.

Overall, it is entirely possible that the conditions of structural deprivation and social disadvantage to which such children are exposed prove a fruitful breeding ground for expressing the frustrations and harmful emotions caused by wider familial stress and disorder. In such cases, the impact of multi-dimensional inequality – of both experience and circumstance – has the potential to significantly increase the propensity to offend, with concomitant risk of damaging a child’s life-chances in a range of other ways. It should also be noted that our data reflect early onset offending behaviours, and that subsequent sweeps may capture higher rates of offending, as well as stronger associations.

Conclusion and policy implications

The debate on the respective effects of ACEs and structural poverty, the relationship between the two, and how governments might best deploy their limited resources to reduce the pernicious impact of inequality, is relevant to a range of policy fields, including youth justice. Our results, based on longitudinal evidence from a contemporary Scottish child cohort study, provide evidence that having more ACEs plays a significant role in explaining involvement in childhood offending. However, considering only the number of ACEs runs the risks of ignoring the importance of certain types of adversity over others, over-predicting risk, and understanding the complex relationships between adversity and poverty. We conclude that, in the presence of ACEs, the direct impact of poverty at the household level on childhood offending is difficult to detect; however, living in persistent poverty at the neighbourhood level remains a key predictor of childhood offending, and has an interdependent relationship with some types of ACEs that deserves further attention. The differential impact of specific types of ACE, as well as the number, is a relatively untapped area of potential academic research that could significantly enhance our understanding of these experiences and how they factor in a range of negative outcomes. An approach that identifies the risks associated with specific experiences may also yield more policy value than the overarching language and theory of ACEs. Relatedly, our results suggest there is value in exploring the range of potentially relevant experiences beyond those in the original Felitti et al. (1988) study.

Our findings are of strong policy relevance, especially within the Scottish context where the government has placed significant emphasis on reducing childhood poverty *and* tackling ACEs. Broadly speaking, the findings demonstrate the need for multiple strategies to address childhood offending. These include universal services to support all children who experience parental treatment (targeting children who experience parental maltreatment within deprived

areas is less likely to be effective because for this group, the impact of poverty is stronger). And separately, poverty-based policies to mitigate the adverse effects of living in deprived areas on the risk of childhood offending. It is the latter that remains the greater challenge. More than a quarter of Scottish children are recognised as living in relative poverty, with recent government figures indicating a gradual upward trend (Scottish Government, 2021). In-work poverty is also increasing, with two-thirds of children in poverty living in working households (Ibid.). Yet with Income Tax rates and bands likely to be frozen for the duration of the 2021-2026 Scottish parliament (SNP, 2021:46), there appears to be little political appetite for the bolder fiscal policies and multiple policy levers required to meet these challenges. Nonetheless, in an era when crime is at a historic low in Scotland, as it is in many other countries, we would reinforce that the time is ripe to tackle some of the wicked problems that have enabled inequality and poverty to persist in the most deprived and disadvantaged communities.

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Appendix One. Study measures, GUS variables and timeframes

Study measures	GUS variables	Timeframe (collected at)
Child offending at age 12	<i>Have you ever _____? If yes, was it in the last year? (child):</i>	
	- Hit, kicked or punched someone with the intention of hurting or injuring	
	- Rowdy/rude in a public place so people complained/you got in trouble?	
	- Taken something from a shop or a store without paying	
	- Deliberately damaged/destroyed property (windows, cars, streetlights)?	Within last year (Sweep 9)
	- Carried a knife or weapon for protection/needed in a fight?	
	- Broken into a locked place to steal something (e.g. house, car)?	
	- Stolen money/other things left lying somewhere (e.g. school or home)?	
Parental maltreatment (Child not loved and/or supported; corporal punishment)	- Written things or sprayed paint on property that did not belong to you?	
	- Used force/threats/weapon to get money/something else from someone	
	<i>My parents ask about my day in school (child)</i>	
	<i>My parents play games or do other fun things with me (child)</i>	(No time frame) Sweep 7
	<i>My parents help me with my homework (child)</i>	
	<i>My parents check to make sure I am doing ok (child)</i>	
	<i>You smack 'childname' with your hand when they have done something wrong</i>	
	<i>You slap 'childname' when they have done something wrong</i>	
Household dysfunction	<i>My parents smack me when I have done something wrong (child)</i>	
	<i>Has 'childname' experienced mental disorder in the immediate family</i>	
	<i>Has 'childname' experienced conflict between parents</i>	Since last sweep (6,7,8,9)
	<i>Has 'childname' experienced drug taking/alcoholism in the immediate family</i>	
	<i>Has any partner or ex-partner ever done any of these things to you?</i>	
	<i>You can choose more than one answer at this question if you wish:</i>	
	- Pushed you or held you down	Since birth of child (sweep 6)
	- Kicked, bitten or hit you	
Family trauma (Bereavement and illness; parental separation)	- Used a weapon against you, e.g. an ashtray or a bottle	
	- Threatened you with a weapon, e.g. an ashtray or a bottle	
	<i>Has 'childname' experienced death of a parent (or parent figure)</i>	
	<i>Has 'childname' experienced death of a brother or sister</i>	Since last sweep (6,7,8,9)
	<i>Has 'childname' experienced parent had a serious illness or accident</i>	
	<i>[If the current respondent is a natural parent and the only natural parent resident at sweep x]</i>	

Family offending	<i>Has 'childname' experienced: parent in trouble with the police</i>	Since last sweep (8,9)
	<i>Has 'childname' experienced: brother/sister in trouble with the police</i>	
	<i>Has 'childname' experienced: parental imprisonment</i>	Since last sweep (6,7,8,9)
Household deprivation	<i>[Annual household income]</i>	Since last sweep (6,7,8,9)
	<i>[At least one parent/carers in full/part-time employment]</i>	
Neighbourhood	<i>[Address]</i>	
Sex	<i>[Asked or coded]</i>	
Ethnicity	<i>To which of these ethnic groups do you consider 'childname' belongs?</i>	Sweep 1
Teen mother	<i>[Age of natural mother at birth of cohort child]</i>	
Child health	<i>How is 'childname's' health in general?</i>	
Additional support needs	<i>Has 'childname' been identified by his/her school or any other professional as having additional support needs?</i>	Sweep 9
Standardized listening score	<i>[Child respondents are assessed using the 'Listening Comprehension' subtest of the Weschler Individual Achievement Tests (WIAT-II)]</i>	
Maternal education level	<i>[Highest education level of mother]</i>	

Unless specified, all questions are answered by the adult respondent.

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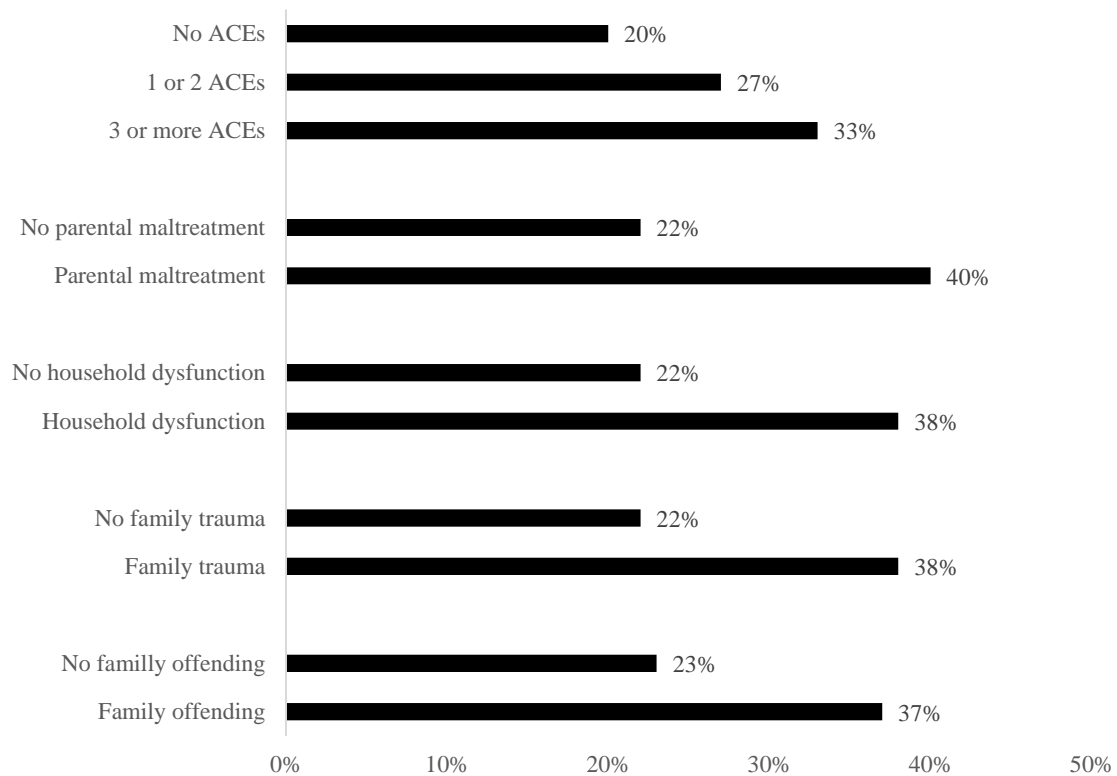
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Figure 1. Prevalence of self-reported offending at age 12 (%) by exposure to cumulative ACEs and ACE types.

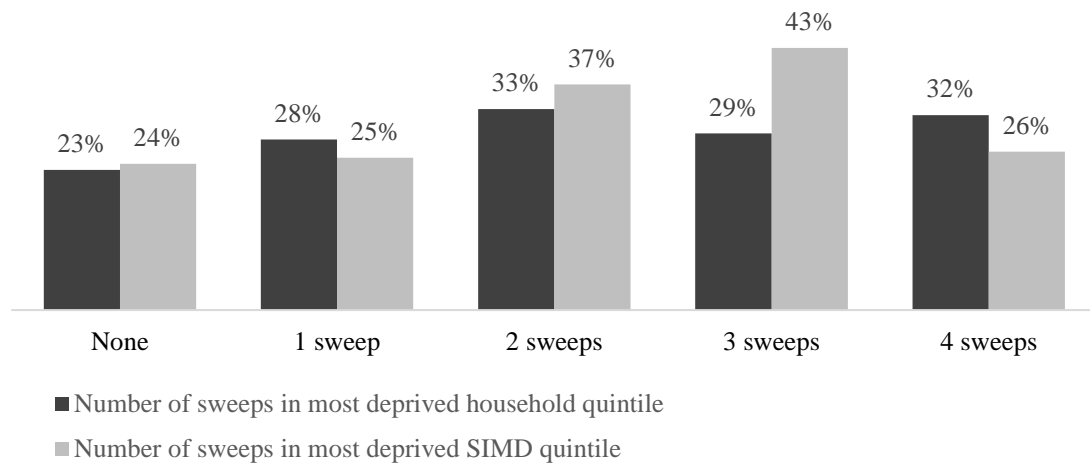


Growing Up in Scotland Survey, sweeps 6 to 9

N = 2,517

Number of ACEs $r = 0.07$ $p \leq .01$; parental maltreatment: $r = 0.06$ $p \leq .01$; household dysfunction: $r = 0.045$ $p \leq .05$; family trauma $r = 0.084$ $p \leq .01$; family offending $r = 0.05$ $p \leq .05$

Figure 2. Prevalence of self-reported offending at age 12 (%) by household and neighbourhood deprivation



Growing Up in Scotland Survey, sweeps 6 to 9

N = 2,517

Household deprivation $r = 0.0789$ $p \leq .01$; Neighbourhood deprivation: $r = .08$ $p \leq .01$

Table 2. Effects of three or more ACEs and household/neighbourhood deprivation on self-reported offending at 12 years

Dependent variable: binary measure of self-reported offending at 12 years	Model 1 ACEs only	Model 2 +deprivation	Model 3 +interactions	Model 4 +controls
Adverse Childhood Experiences				
3 or more ACEs	0.422** (0.148)	0.291 (0.161)	0.546* (0.213)	0.445* (0.218)
Growing up in poverty				
Household deprivation		0.077 (0.046)	0.086 (0.052)	0.038 (0.057)
Neighbourhood deprivation		0.045 (0.046)	0.082 (0.050)	0.086 (0.053)
Interaction effects				
Household deprivation x 3+ ACEs			-0.039 (0.106)	-0.002 (0.108)
Neighbourhood deprivation x 3+ ACEs			-0.152 (0.111)	-0.162 (0.115)
Controls				
Child sex (reference male)				-0.865*** (0.118)
Child general health (good to poor)				0.478* (0.205)
Constant	-1.145*** (0.059)	-1.245*** (0.061)	-1.283*** (0.063)	-0.187 (0.475)
Observations	2,516	2,516	2,516	2,447

Growing Up in Scotland, Sweeps 6 to 9

Logit coefficients with robust standard errors in parentheses.

* $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Error! Reference source not found. **3. Effects of different ACE types and household/neighbourhood deprivation on self-reported offending at 12 years**

Dependent variable: binary measure of self-reported offending at 12 years	Model 5 ACEs only	Model 6 +deprivation	Model 7 +interactions	Model 8 +controls
Adverse childhood experiences				
Family offending (FO)	0.612* (0.276)	0.572* (0.276)	0.281 (0.408)	0.378 (0.426)
Household dysfunction (HD)	0.062 (0.095)	0.042 (0.095)	0.093 (0.120)	0.104 (0.131)
Parental maltreatment (PM)	0.323*** (0.092)	0.295** (0.093)	0.314** (0.107)	0.232* (0.111)
Family trauma (FT)	0.082 (0.97)	0.019 (0.103)	0.165 (0.128)	0.141 (0.134)
Growing up in poverty				
Household deprivation		0.06 (0.047)	0.064 (0.073)	0.030 (0.077)
Neighbourhood deprivation		0.043 (0.043)	0.145* (0.066)	0.152* (0.069)
Interaction effects (sig. effects only)				
Neighbourhood deprivation x PM			-0.151* (0.077)	-0.169* (0.079)
Controls				
Child sex (reference = male)				-0.841*** (0.118)
Child general health (good to poor)				0.474* (0.208)
Constant	-1.298*** (0.071)	-1.349*** (0.073)	-1.426*** (0.079)	-0.526 (0.480)
Observations	2,516	2,516	2,516	2,447

Growing Up in Scotland, Sweeps 6 to 9

Logit coefficients with robust standard errors in parentheses.

*p ≤ 0.05 **p ≤ 0.01 ***p ≤ 0.001