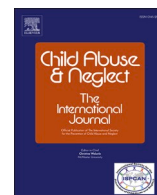




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Violence against children: An application of Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (MAIHDA) to the Crime Survey for England and Wales[☆]

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ABSTRACT

Background: Violence victimization in childhood is a significant public health and social justice concern. Yet there is limited evidence on how multiple, overlapping identities relate to children's experiences of non-familial violence.

Objectives: This study examines differences in violence victimization rates among children in different social groups. In doing so, we seek to demonstrate the application of Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (MAIHDA) as a method for intersectional analysis.

Participants and setting: The study uses nine years of pooled data from the 10–15 Crime Survey for England and Wales (2011–2019), including a total sample of 26,106 children aged 10–15 years old.

Methods: Logistic MAIHDA models were employed to analyse the likelihood of experiencing violence victimization across intersectional social groups defined by combinations of four social identities (sex, age, ethnicity, disability status).

Results: Most of the differences in violence victimization across intersectional social groups are explained by individual characteristics like disability, sex, ethnicity, and age. Interaction effects between these characteristics add little beyond their separate (additive) impacts. Predicted probabilities show that disabled boys are among the most likely to experience violence victimization.

Conclusion: The study underscores the need for targeted policies and interventions to reduce violence against children, particularly those who are disabled. It also serves as a case study for researchers interested in using MAIHDA to explore intersectionality in crime against children (or any other outcomes) and inform harm prevention strategies.

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1. Introduction

Abundant evidence demonstrates the cumulative harmful effects of experiencing violence on children's health, educational attainment, and later-life outcomes (Álvarez-Lister et al., 2017; Birnkammer et al., 2024; Radford et al., 2013; Semenza et al., 2021). While previous research often examines individual characteristics of children in isolation and compares groups to a reference category (e.g., boys or white children), this can obscure the relationship between overlapping identities of children and their experiences of violence as a victim. The invisibility of such effects may in turn hinder identifying those most at risk and unintentionally reinforce existing inequalities. To avoid this, it is essential that research and practice take an intersectional approach (Collins & Bilge, 2020; Crenshaw, 1989, 1991) to investigate how overlapping social characteristics (e.g., ethnic minority disabled young boys) are related to children's victimization risk. The current paper speaks to this need to develop the literature.

This study explores how the risk of violence victimization varies between intersectional social groups (henceforth stratum/strata) defined by the combination of sex, age, ethnicity, and disability status. We analyse a leading source of victimization data - the Crime Survey for England and Wales - (i.e., the CSEW; Flatley, 2014) for 10–15-year-olds, and employ a cutting-edge analytical approach known as Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (MAIHDA) developed by Evans et al. (2018, 2024). In doing so, we produce nuanced and statistically robust estimates of victimization risk by strata, that improve upon those generated by conventional analytical methods (Leckie et al., 2025; Mahendran et al., 2022a, 2022b; Van Dusen et al., 2024). The findings of the current study enhance our understanding of which group of children are at most risk of violence victimization.

2. Literature review

Two of the most common theories to explain victimization are routine activities approach (Cohen & Felson, 1979), and target congruence theory (Finkelhor & Asdigian, 1996). Routine activity approach suggests that crime happens when three things come together at the same time and place: someone who wants to commit a crime, someone or something that can be targeted, and no one around to stop it. The routines of everyday life determine how often these three elements converge. Target congruence theory offers an alternative framework. It shifts the focus to the interaction between offender motivations and victim characteristics. The three central constructs - vulnerability (e.g., physical or psychological weakness), gratifiability (e.g., female gender), and antagonism (e.g., ethnic or group identities that may spark hostility) - explain how individual differences among youths contribute to their risk of being targeted.

Drawing on these theories, previous research has identified a range of individual-level predictors of victimization of children and young people, including being a boy (Radford et al., 2014; Turner et al., 2016), living in a single adult household (Turner et al., 2016), being from an ethnic minority (Lasky et al., 2021) and having a disability (Jones et al., 2012). Other risk factors include alcohol and drug use (Turner et al., 2016), loneliness (Matthews et al., 2020), association with peers or parents involved in problematic behaviour (Finkelhor et al., 2009) and spending more time away from home (Lasky et al., 2021).

The two theories mentioned above are dated (but used frequently) and include constructs such as antagonism that seem to blame being a part of certain ethnic groups, for example, as sparking hostility (Walklate, 2018). Intersectionality is an alternative framework that help us understand violence victimization because it recognises that risks are not evenly distributed across social groups, but emerge from the interaction of multiple, overlapping dimensions of inequality and marginalization. In other words, it helps us understand how overlapping social identities - such as sex, ethnicity, age, and disability status - interact and relate to experiencing violence as a victim.

Originally developed within Black feminist scholarship (Crenshaw, 1989; Collins & Bilge, 2020), the intersectional approach moves beyond additive models of disadvantage to consider how social identities such as sex, ethnicity, age, disability, and social class mutually construct one another in shaping exposure to harm. In the context of victimization, this means that children's experiences of violence cannot be fully explained by single-axis categories like sex or ethnicity alone. Instead, these identities intersect within broader structural hierarchies of power and exclusion that organise vulnerability and access to protection (Walby et al., 2012).

For example, in the United States (U.S.) previous research found that Black boys and men face disproportionately high risks of violent victimization, both from private citizens and the police, due to racist stereotypes that depict them as dangerous or criminal, fuelling fear and suspicion (Berg, 2014). The marginalization and social isolation experienced by men of colour in the U.S. stem from overlapping racial stereotypes, limited access to mainstream opportunities amid deep structural inequality, and societal expectations of hypermasculinity. Similarly, previous U.S.-based research on exposure to violence and disabilities indicates that children with disabilities are at greater risk of victimization than those without disabilities (Rand & Harrell, 2009; Sullivan, 2009). Disabled children and young people experience elevated risks of violence victimization due to intersecting structures of social exclusion, dependency, and ableism. Intersectional research demonstrates that disability amplifies vulnerability through its interaction with other social positions such as sex, ethnicity, and age. For example, Liasidou and Gregoriou (2025) identified that disabled individuals face disproportionately high risks of interpersonal violence, as disability interacts with systemic inequalities and social prejudices to intensify exposure to harm. Disability-related violence often arises from assumptions of dependency and diminished credibility, combined with institutional neglect and marginalization that limit children's access to protective networks and justice. Similarly, Wickenden (2023) highlights that disabled people encounter reinforced stigma and exclusion where disability intersects with other marginalized identities, deepening power asymmetries and exposure to violence.

While recent quantitative research has explored how adults in England and Wales experience violence as a victim depending on the combination of their identities such as ethnicity, sex, age, and disability status (Liasidou & Gregoriou, 2025; Tura et al., 2025), comparable research on child victimization remains underdeveloped, especially in the UK (Nation et al., 2023). Existing studies typically rely on conventional statistical approaches (e.g., binary or multinomial logistic, or linear regression) which compare groups

based on a single reference category (girls vs boys; Radford et al., 2013; Jackson et al., 2016). Some studies include interaction terms (Jackson et al., 2017; Liasidou & Gregoriou, 2025) but these models become increasingly difficult to interpret as more variables are added (Evans et al., 2024). Consequently, prior studies have only examined a narrow range of intersecting identity characteristics (e.g., ethnicity and sex) and have not fully explored intersectional inequalities in violence against children (e.g., Birnkammer et al., 2024; Youth Endowment Fund, 2023). Therefore, we use an innovative new statistical framework, MAIHDA, to conduct a more detailed and robust analysis of violence against children in England and Wales. This approach allows for estimation of average differences between intersectional strata (social groups), in-depth exploration of interaction effects, as well as decomposition of the total individual variation (heterogeneity) in individual outcomes within and between strata (Evans et al., 2024).

3. The current study

In the current study, we use MAIHDA instead of traditional regression models with interaction terms for several reasons. In addition to the challenges noted above of interpreting interaction terms in regression models, the reliance on a dominant reference group which are often White or non-disabled individuals, frames this group as the default or norm, against which all others are implicitly compared. This can obscure the structural dynamics of privilege and marginalization by centring dominant identities in the analytical framework (Evans et al., 2018, 2024).

MAIHDA offers a robust alternative by modelling individuals nested within intersectional social strata - groups defined by combinations of characteristics like sex, age, ethnicity, and disability. This approach allows us to estimate both fixed effects (the separate influence of each individual characteristic) and interaction/random effects (which tell us whether specific combinations of characteristics lead to higher or lower risks than expected). For example, MAIHDA can show not just that boys and disabled children are each at higher risk of violence victimization, but whether disabled boys experience even greater risk than we would expect just by adding those two effects together. This helps reveal how overlapping social identities are related to people's experiences in more complex ways. In addition, MAIHDA does not require the specification of reference categories or interaction terms. Instead, it enables the analysis of strata effects without privileging any one group as the normative baseline. This structure aligns more closely with the theoretical foundations of intersectionality, which recognise that disadvantage and advantage emerge from the interaction of multiple social positions rather than from additive or comparative effects. MAIHDA therefore provides a methodologically and conceptually preferable approach to examining intersectional inequalities in violence victimization (Leckie et al., 2025; Mahendran et al., 2022a, 2022b; Van Dusen et al., 2024).

4. Methodology

4.1. Data

This study merged and analysed nine years (2011/12–2019/20) of the 10–15-year-old CSEW (Office for National Statistics, 2024, 2020a, 2020b, 2020c, 2021a, 2022, 2023, 2021b, 2021c). As the children data collected before 2011/12 are considered experimental, they were excluded from the analysis. The analysis ends in 2019/20 due to the COVID-19 pandemic (ONS, 2020b) disrupting the CSEW.

The CSEW is widely regarded as a gold-standard, nationally representative survey of crime victimization (Flatley, 2014). The survey uses a stratified, multi-clustered cross-sectional random sampling design, in which participants are interviewed once and asked

Table 1
Descriptive statistics (2011–2019).

Dependent variable	Category	N	%
Any violence	0	24,553	94.1
	1 or more	1553	5.9
Social identity variables*	Category	N	%
Sex	Male	13,459	51.6
	Female	12,647	48.4
Age	10–12	12,876	49.3
	13–15	13,230	50.7
Ethnicity	White	21,335	81.7
	Mixed	933	3.6
	Asian	2285	8.8
	Black	1099	4.2
	Chinese	76	0.3
	Other	378	1.4
Long-term illness or disability	Yes	2428	9.3
	No	23,678	90.7

* See appendix tables for strata sample sizes.

about any crimes experienced in the previous 12 months. In each participating household, one child is selected to complete the survey after an adult has taken part in the main interview. Similarly to the adult component of the survey, children are asked about any crimes experienced in the previous 12 months. However, the 10–15 CSEW does not include questions about any crimes against the sampled children perpetrated by a family member. This is to ensure that incidents between siblings do not distort crime against children estimates. Moreover the survey's respondent confidentiality would have been challenged from questions on child abuse at home. Potential positive answers to such questions would have initiated a child protection case (ONS, 2019).

The CSEW maintains a consistent sampling approach and questionnaire across time. We used data from the screener questionnaires (also known as “non-victim forms”), as they reflect the frequency of violence victimization among the entire children sample. The achieved annual sample size for the 10–15-year-old cohort is approximately 3000. After data cleaning, the final pooled sample from 2011 to 2019 consisted of 26,106 children (original $N = 26,238$; see Table 1 for descriptive statistics).

4.2. Dependent variable

The 10–15-year-old CSEW does not measure intrafamilial violence against children, so the dependent variable is a binary coded extrafamilial violence victimization variable (0 = no violence, 1 = 1 or more violence victimization occurring outside of the family). This measures wounding, assault with and without injury (e.g., pushing or shoving), and robbery (see Table 1 for descriptive statistics). We chose to binary code the dependent variable because our primary interest lies in the occurrence of the event (e.g., whether an individual experienced a particular outcome), rather than its severity. This aligns with the theoretical framing of our study, which focuses on risk and exposure across intersectional social positions. While Poisson and Negative Binomial models are commonly used for count data, their application within the MAIHDA framework is still methodologically underdeveloped and computationally complex, particularly when modelling intersectional strata with sparse data (Evans et al., 2018).

4.3. Social identity variables to construct strata

MAIHDA treats the data as hierarchically structured, with individuals (level 1) nested within strata (level 2). Unlike traditional multilevel models that typically nest individuals within higher-level geographical or institutional units (e.g., pupils within classrooms), MAIHDA defines the higher-level (i.e., level 2) using unique combinations of individual-level social identities, such as sex, ethnicity, age, and disability status. While these characteristics belong to individuals, they are used here to construct strata (groups with the same unique combination of characteristics).

In this study, 48 unique strata were formed by combining two categories of sex (female, male - the term “sex” is used rather than “gender” in line with the way the data was recorded in the original survey.), six of ethnicity (Asian, Black, Chinese, Mixed, Other, White), two age groups (10–12 years and 13–15 years - reflect the original aggregation in the CSEW dataset), and two categories of long-term illness or disability (has or does not have) ($2 * 6 * 2 * 2 = 48$). Descriptive statistics for these variables are provided in Table 1. Each stratum was labelled to reflect its intersectional composition (e.g., Female, Black, aged 10–12, and disabled). One combination was empty (Male, Chinese, aged 10–12, and disabled), leaving 47 strata in the final analysis.

The selection of sex, ethnicity, age, and disability status as the four axes of social identity for constructing strata in the MAIHDA models was guided by both theoretical and practical considerations. Theoretically, these dimensions represent well-established axes of inequality and marginalization relevant to children's victimization experiences, as recognised in criminological and intersectionality research (Crenshaw, 1991; Evans et al., 2024; Healy & Colliver, 2024). In particular, these characteristics align with the protected characteristics set out in the UK Equality Act 2010, attributes legally recognised as potential grounds for discrimination, providing a useful framework for exploring intersectional disparities in children's experiences of violence, with relevance beyond the UK context. From a practical standpoint, these were the key identity variables consistently and reliably measured in the CSEW children dataset. Other potential axes of inequality, such as socioeconomic status or sexual orientation, were either not available or insufficiently measured for the child sample. Moreover, including a larger number of identity dimensions or more granular categories would have produced a high number of small or empty strata, compromising model stability and interpretability given the available sample size. The decision to use these variables therefore reflects a balance between theoretical relevance and practical feasibility, ensuring sufficient cases within each intersectional stratum while capturing key dimensions of social inequality relevant to violence victimization in childhood.

4.4. Statistical analysis

Following the MAIHDA framework, logistic multilevel modelling was used to examine differences in children's experiences of violence victimization across different strata. In this analysis, children (level 1, $n = 26,106$) were nested within the 47 unique strata (level 2) (Evans et al., 2018, 2024). The first step involved fitting a ‘null’ or ‘empty’ logistic MAIHDA model (Model 1), which included only random intercepts for all strata. This model captured between-strata variability in violence victimization, that is, the differences in victimization rates for different intersectional groups. Therefore the model enabled the calculation of the Variance Partition Coefficient (VPC; Goldstein et al., 2002; Leckie et al., 2020), which quantified how much of the total variation in violence victimization was attributable to differences between strata. VPC was calculated by dividing the strata-level variance by the sum of the strata-level variance and the individual-level variance. For example, if the total variance in victimization is 1.0, and 0.2 of this is due to differences between strata (e.g., young disabled white girl versus older non-disabled black girl), the VPC would be $0.2 / (0.2 + 0.8) = 0.20$. This means that 20% of the variation in violence victimization can be attributed to differences between strata, while the remaining 80%

reflects individual-level variation within those strata.

Subsequently, a “main-effects” or “additive” model (Model 2) was estimated, which included all the variables used to define the strata (sex, ethnicity, age, and disability status) as fixed/main effects dummy variables. This specification allows the strata-level random effects to capture any remaining between-strata variation that reflects higher-order intersectional interactions above and beyond the additive main effects.

VPC was calculated for Model 2 as well. To assess how much of the between-strata variation could be explained by the main effects alone, the Proportional Change in Variance (PCV) was computed. PCV was calculated as the difference between the strata-level variance in Model 1 and the strata-level variance in Model 2, divided by the strata-level variance in Model 1. A PCV substantially below 100% suggests that interaction effects continue to play a role, as some strata exhibit levels of victimization that deviate from what would be expected based on additive patterns alone (Evans et al., 2024).

Using Model 2, we also estimated and plotted predicted probabilities of victimization, which were reported as percentages (i.e., probabilities x 100) for 47 strata. All data cleaning and statistical analyses were conducted using R (version 4.4.1). Replication codes are available at <https://anonymous.4open.science/r/MAIHDA-children-E0F0/README.md>.

5. Results

Table 2 presents the results from two logistic MAIHDA models, which include odds ratios (ORs), 95% confidence intervals (CIs), *p*-values, within- and between-strata variances, the Variance Partition Coefficient (VPC), and the Proportional Change in Variance (PCV) values. Model 1 is a null model (random intercepts only), without explanatory variables, and Model 2 includes additive main/fixed effects for individual-level social identity characteristics (sex, age, ethnicity, and disability status).

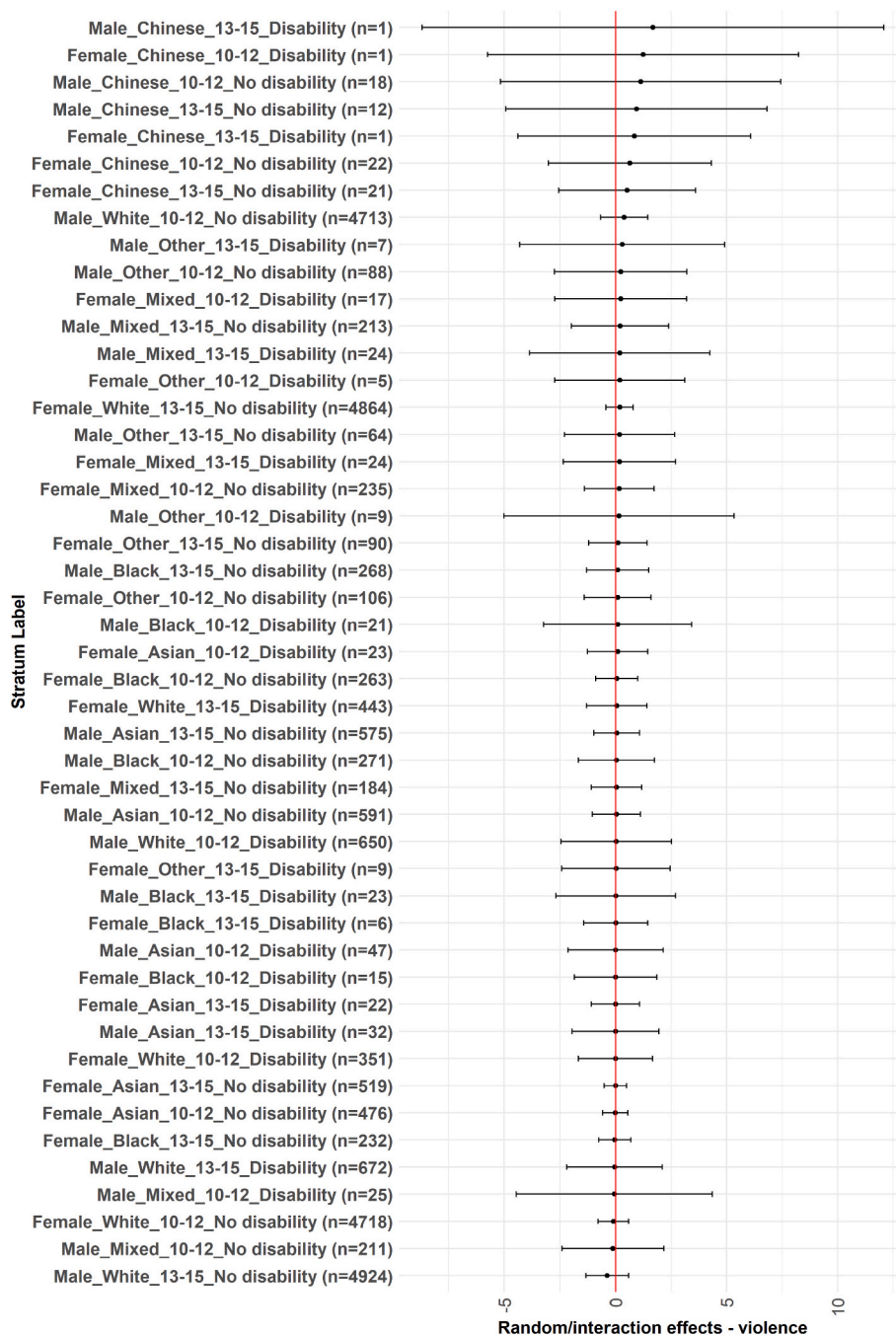
In Model 1, 12% of the variation in children's risk of experiencing violence was due to differences between strata. This measure of 12%, known as the VPC, shows that the intersectional positions children hold in society account for a meaningful portion of the overall variation in victimization risk. In other words, structural social differences shaped by intersecting identities are associated with heightened risk of violence victimization, even accounting for individual-level variation within these social strata.

When the variables used to construct the strata were added as fixed effects in Model 2, the VPC decreased to just 0.10%. Comparing the between strata-variance from Model 2 to that in Model 1, the PCV was 99.2%, meaning that 99.2% of the between-strata variance in Model 1 was explained by the additive main effects in Model 2. This suggests that nearly all the variation in victimization across strata can be attributed to additive socio-demographic characteristics (sex, age, ethnicity, disability status). Only 0.8% (100% - 99.2%) of the original variance remained unexplained, implying that interaction effects - while potentially present - play a minimal role statistically in explaining inequalities between strata (see Fig. 1 and Appendix Table 1).

Table 2
Results from MAIHDA models predicting violence victimization.

	Model 1		Model 2	
Main effects: regression coefficients	OR	95% CI	OR	95% CI
(Intercept)	0.05 ***	0.04–0.07	0.05 ***	0.04–0.05
Sex - Male (ref: Female)			2.02 ***	1.76–2.31
Age - 13–15 (ref: 10–12)			0.82 **	0.71–0.94
Ethnicity - Mixed (ref: White)			1.09	0.83–1.43
Ethnicity - Asian			0.46 ***	0.36–0.60
Ethnicity - Black			0.61 **	0.44–0.83
Ethnicity - Chinese			0.22	0.03–1.58
Ethnicity - Other			0.64	0.38–1.08
Long term illness/disability - Yes (ref: No)			1.98 ***	1.68–2.32
Random effects: variances				
Individual-level ~	3.29		3.29	
Stratum-level	0.44		0.003	
Summary statistics				
VPC	12%		0.10%	
PCV			99.2%	
AIC	11,496.6		11,448.4	
LRT	$\chi^2(1) = 284.19^{***}$		$\chi^2(8) = 64.171^{***}$	
AUC	0.637		0.633	
N stratum	47		47	
N children	26,106		26,106	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$. In Model 1 column, the Likelihood Ratio Test (LRT) compare the null logistic MAIHDA models to their conventional binary logistic regression counterpart. In Model 2 column, the LRT compare the full logistic MAIHDA model to the null logistic MAIHDA model. The figures mean subsequent models fit the data better. VPC: Variance Partition Coefficient, PCV: Proportional Change in Variance, AIC: Akaike Information Criterion, AUC: Area Under the Curve. ~ Please note that the value 3.29 is the fixed variance of a standard logistic distribution. To calculate the VPC for a logistic multilevel model, we used the latent variable method proposed by Goldstein et al. (2002).



Evans et al. (2024), however, note that MAIHDA typically produces more conservative, shrunken estimates compared to traditional regression. While interaction effects may exist in the population, they may not be detected if strata sample sizes are small. MAIHDA reduces the risk of Type I (false-positive) errors by shrinking estimates toward zero - a strength of the method - but this also limits its power to detect subtle interaction effects, particularly in smaller strata (see Appendix Tables 1 and 2).

Who is at greater risk of violence victimization then? This is evident by the main effects patterns in Model 2. Boys are twice as likely to experience violence victimization compared to girls (OR = 2.02, 95% CI [1.76, 2.31]). Children aged 13–15 are 18% less likely to experience violence than those aged 10–12 (OR = 0.82, 95% CI [0.71, 0.94]). Ethnicity also plays a significant role: Asian children are 54% less likely to be victims of violence than White children (OR = 0.46, 95% CI [0.36, 0.60]), and Black children are 39% less likely (OR = 0.61, 95% CI [0.44, 0.83]). Children with a long-term illness or disability are almost twice as likely to experience violence

victimization compared to children without such conditions (OR = 1.98, 95% CI [1.68, 2.32]). These findings highlight the substantial impact of sex, age, ethnicity, and disability on children's risk of experiencing violence.

Despite the strong explanatory power of the main effects in Model 2, with the additive socio-demographic variables accounting for 99.2% of the between-stratum variance, the plot of predicted probabilities across strata (see Fig. 2 and Appendix Table 2) reveals important differences in victimization risk that merit attention. Strata that include disabled children consistently show higher predicted probabilities of experiencing violence. Particularly, seven of the ten highest-risk strata comprise disabled boys, which shows their increased vulnerability. In contrast, strata comprising non-disabled girls tend to have the lowest predicted probabilities. These patterns highlight the value of examining predicted probabilities alongside variance components, as they offer additional insight into how intersecting identities relate to children's exposure to violence, even when interaction effects are not statistically prominent.

In summary, Model 2 suggests that disparities in violence victimization across strata are largely explained by the additive fixed

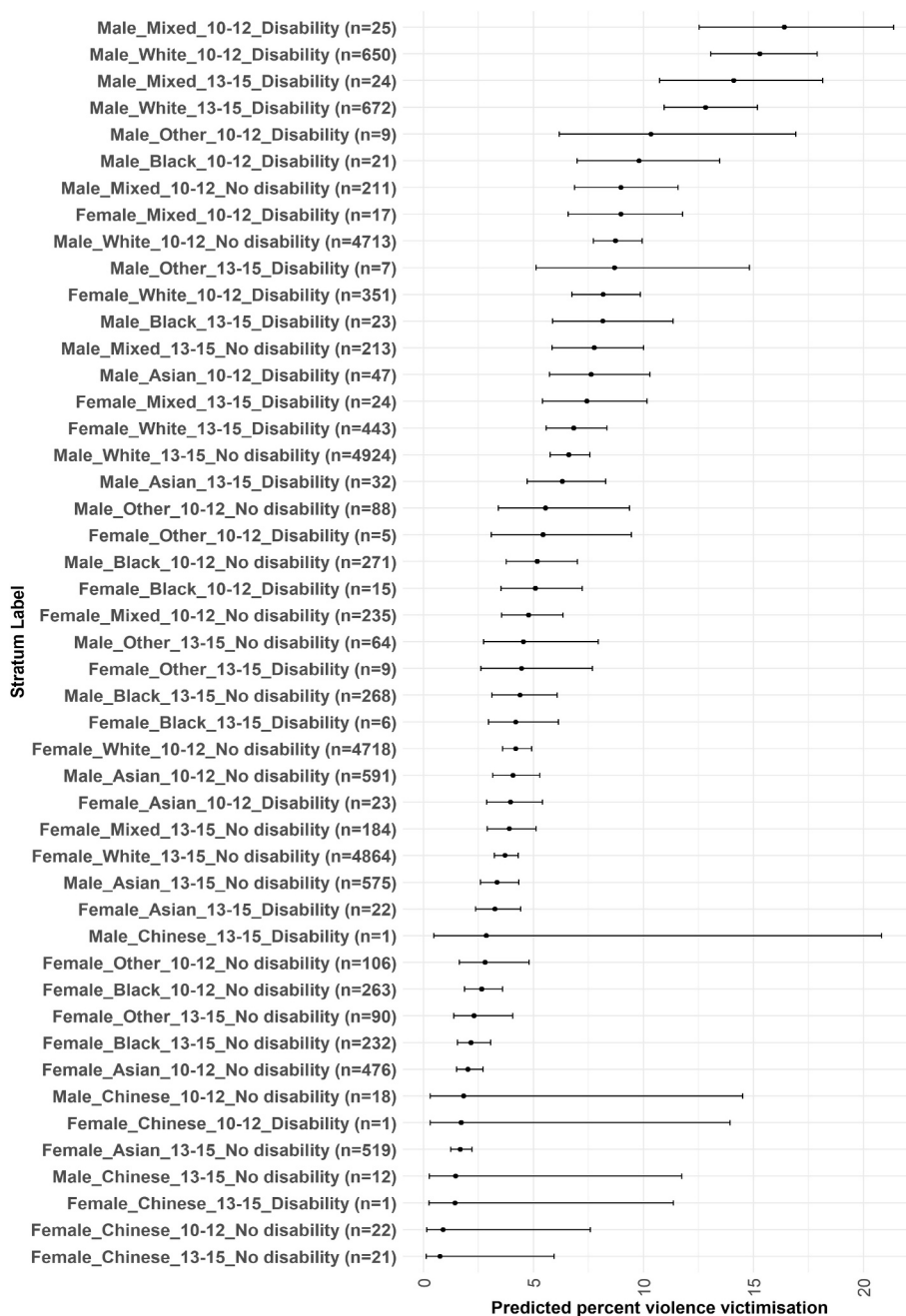


Fig. 2. Predicted percent violence victim by strata from Model 2.

effects of socio-demographic characteristics - namely sex, ethnicity, age, and disability status. In Model 1, the VPC was 12%, which indicates substantial between-strata variance when no fixed effects were included. In Model 2, the VPC dropped to 0.10%, and the PCV was 99.2%, which suggest that the addition of individual-level fixed effects (e.g., sex, age, ethnicity, disability) accounted for nearly all of the between-strata variation. This indicates that most of the disparities between strata can be attributed to the main effects of the individual-level characteristics used to define those strata. However, predicted probabilities still reveal meaningful variation across strata, particularly for high-risk groups such as disabled children. This suggests that, while statistical interaction effects may not be prominent, they could still have practical or real-world significance. A larger sample size may be required to detect and model these interaction effects more robustly.

6. Discussion and conclusion

The aim of this study was to analyse the relationship between intersecting identities and the probability of experiencing violence victimization by children aged 10–15 in England and Wales. For this, we used an innovative multilevel modelling technique, MAIHDA (Evans et al., 2018, 2024). We found that fixed/main effects such as being a boy, young, and disabled child are associated with higher likelihood of experiencing violence. These results align with the findings from previous studies that used well-established statistical techniques (Jones et al., 2012; Lasky et al., 2021; Radford et al., 2014; Turner et al., 2016). Looking at intersecting identities and risk of violence victimization, we found that disabled boys are the most at-risk group (7 out of 10 strata with the highest predicted probability of experiencing violence - see Fig. 1).

While the direction of the main effects identified here, such as higher risks among boys and children with disabilities, echoes findings from previous studies, this study contributes new insights by quantifying how much of the overall inequality in violence victimization is explained by additive versus intersectional effects. In doing so, it moves beyond simply identifying risk factors to exploring the structure of inequality itself. This approach reveals not only that disabled boys face the highest predicted probabilities of victimization, but also that most observed disparities are additive rather than strongly intersectional, meaning that the risks associated with different social characteristics tend to combine rather than amplify one another in unique ways. Such evidence helps to clarify whether prevention efforts should prioritise addressing broad structural inequalities, such as sexism, racism, and ableism, or focus on specific, compounding intersections of identity.

The results therefore suggest that targeted interventions are needed to reduce the risk of experiencing violence by certain groups of children, particularly disabled boys. In practice, professionals including social workers, healthcare providers, law enforcement officers, and teachers would benefit from receiving targeted training and guidance to identify and support children at increased risk, particularly boys with long-term illness or disability. Targeted training in this context refers to professional development that enhances practitioners' understanding of how disability and sex intersect to influence vulnerability. For example, training could focus on recognising signs of violence victimization among disabled boys, addressing ableist stereotypes that may minimise their victimization, and promoting inclusive safeguarding practices, which would eventually challenge the cultural norm of discouraging help seeking (Heilman & Barker, 2018). This might include strengthening school-based anti-violence victimization policies, ensuring accessible reporting mechanisms, and improving coordination between education, social care, and health services to ensure timely and more sensitive prevention or intervention. Our findings also call for enhancing schools' funding to allow adequate teaching staff numbers and premises for supporting all pupils, with and without recognised Special Education Needs.

Compared to traditional regression models that include selected interaction terms, MAIHDA offers a more systematic and parsimonious way of examining how multiple social identities intersect to shape outcomes. Rather than relying on researcher-defined interactions - often limited in number due to concerns about statistical power (Evans et al., 2024) - MAIHDA uses a multilevel framework that treats intersectional strata as higher-level units. This allows for the estimation of both additive (main) effects and intersectional (random) effects simultaneously, which provide a clearer picture of which combinations of characteristics are associated with elevated risk. In doing so, MAIHDA avoids issues of model overfitting and multicollinearity that commonly arise in interaction-heavy models, and it enables the detection of inequalities that might otherwise be masked in aggregate analyses (Leckie et al., 2025; Mahendran et al., 2022a, 2022b; Van Dusen et al., 2024). Crucially, small intersection sizes are very common in empirical MAIHDA applications (Evans et al., 2024) and the intersections of the very greatest interest, those representing multiply marginalized groups, tend to be the very smallest (Leckie et al., 2025). Recent research empirically tested and showed that the MAIHDA models perform better than traditional models when the strata are sparsely populated (Leckie et al., 2025). We also fitted a binary logistic regression model with a 4-way interaction as a sensitivity check (see Appendix Table 3 and Appendix Fig. 1), and the model failed to produce stable estimates for several small size strata. Confidence intervals for some combinations of sex, age, ethnicity, and disability were implausibly wide, indicating sparse data problems. These issues are precisely what MAIHDA is designed to address (Leckie et al., 2025; Mahendran et al., 2022a, 2022b; Van Dusen et al., 2024). This therefore makes MAIHDA particularly well suited for intersectional research focused on social inequalities, such as disparities in violence victimization among children or any other outcomes.

In addition, as with most population-based survey data, the sample reflects underlying demographic distributions, with larger numbers of White non-disabled respondents relative to other groups. While this results in unequal representation across strata, MAIHDA is well suited to handle such data structures. By estimating random effects for each intersectional stratum, the model borrows information across all groups, thereby stabilising estimates for smaller strata while still allowing for the detection of distinct intersectional effects (Evans et al., 2024). Rather than being a limitation unique to this study, such imbalance reflects the demographic realities of the population and the design of the CSEW, which was not specifically stratified by intersectional identities.

The current study is however not without its limitations. First, the CSEW includes only children living in private households, which means that children in care settings or secure accommodation, for example, are not represented. As a result, the findings are not

generalisable to all children. Second, we acknowledge the limitation regarding the scope of violence victimization captured in our study. The CSEW does not include measures of intrafamilial violence, such as abuse occurring within the home or by family members. As a result, our operationalization of violence victimization necessarily focuses on experiences of non-familial violence occurring outside the home. This constraint means that the prevalence of violence against children reported in our study is likely underestimated, and should be interpreted as reflecting non-domestic, non-familial forms of violence only. Third, the CSEW do not capture gender or sexual orientation, therefore non-binary children are not represented in the analysis. Fourth, the CSEW does not include children younger than 10 or older than 15. The adult component of the CSEW include individuals aged 16–17 but the measurement of violence in the adult CSEW is different. Fifth, the CSEW measurement of ethnicity is not detailed enough, with only 6 categories. Sixth, because we did not want to have too many strata with small sample size for the sake of robustness of the analysis, we used a binary disability status variable. Finally, the difficulty in identifying interaction effects likely reflects an issue of statistical power. Given the characteristics of the data, larger sample sizes for strata would be necessary to achieve the precision required to accurately identify where the interaction effects are operating. Although the overall sample size was large ($n = 26,106$), the precision with which intersectional effects can be identified in MAIHDA depends on the number of respondents within each stratum rather than the total sample. Some intersectional combinations, such as disabled children from minoritised ethnic backgrounds, were represented by small numbers of cases, which reduces the power to detect subtle non-additive effects. This is a common feature of population survey data not explicitly stratified by intersectional identities, and it underscores the importance of larger datasets when aiming to estimate small intersectional variances with greater precision. Future research could extend this work by applying a cross-classified multilevel model (CCMM) where individuals (level 1) are nested in both intersectional strata (level 2) and a context such as schools (level 2), which are cross-classified with each other. This might be done simply to test the robustness of “core” MAIHDA results when context is adjusted for (Evans et al., 2024). Additionally, future studies could explore longitudinal designs to examine how intersectional vulnerabilities develop or change over time (Bell et al., 2024), or use mixed-methods approaches to capture children's lived experiences of victimization (see Fehrenbacher & Patel, 2019). Researchers could also investigate the intersection of additional axes of inequality, such as socioeconomic status, sexual orientation, gender identity, or religion, to provide a more comprehensive understanding of structural and social determinants of violence.

In summary, this first application of MAIHDA to investigate crime against children in England and Wales sheds light on the children most vulnerable to violence. An intersectional approach highlights how their experiences are shaped not by a single aspect of identity, but by the overlap of disability with other social factors such as age, sex, and ethnicity. These intersecting identities increase the probability of experiencing violence by disabled children, who are often overlooked in mainstream safeguarding approaches (Franklin et al., 2022). The elevated risk faced by disabled boys especially likely reflects the convergence of gendered socialisation and structural ableism. Research suggests that boys are more likely to experience physical or peer-related violence, partly due to social norms around masculinity that tolerate aggression or discourage help-seeking (Heilman & Barker, 2018; O'Donnell et al., 2024). When disability intersects with these norms, it can amplify vulnerability: disabled children often face social exclusion, stigma, and reduced access to protective networks (Franklin et al., 2022; Jones et al., 2012). Disabled boys, in particular, may be doubly disadvantaged, perceived as ‘different’ within peer groups and less likely to receive timely support from adults, leaving them more exposed to victimization. These patterns reflect broader sociopolitical dynamics of ableism and gendered inequality, rather than inherent individual risk. The findings can be used for more targeted and effective responses from policy makers and practitioners. We encourage researchers to use MAIHDA to investigate how intersecting identities relate to violence victimization, or any outcomes of interest, to inform harm prevention.

CRediT authorship contribution statement

Ferhat Tura: Writing – review & editing, Writing – original draft, Visualization, Software, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Andromachi Tseloni:** Writing – review & editing, Writing – original draft, Funding acquisition. **Lisa Tompson:** Writing – review & editing, Writing – original draft.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chiabu.2026.107930>.

Data availability

The authors do not have permission to share data.

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