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## Article:

**ORIGINAL ARTICLE**

# Early life risk factors for adolescent mental health difficulties for individuals at risk of developmental language disorder

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**Abstract**

Young people with developmental language disorder (DLD) often have poorer mental health compared to those without DLD. However, not all young people with DLD experience such difficulties. Two hundred and eighty-one young people at risk of DLD (45% Female; 53% White British) were identified from a UK based population-cohort. Main caregivers completed questionnaires about their early life (<5 years) and their mental health (at 14 years). Parent–child conflict was revealed to be an early risk factor for all mental health outcomes, at age 14. Additionally, harsh discipline and second-hand smoke predicted worse externalising problems, and gender differences predicted worse internalising problems. Further findings demonstrated that, as the number of risk factors increased, so did the severity of mental health difficulties.

**KEYWORDS**

cumulative risk, developmental language disorder, early risk, mental health, millennium cohort study

**Key Points**

- High parent–child conflict up to the age of 5 years old likely predicts greater severity of internalising (anxiety and depression) and externalising (attention deficit hyperactivity disorder and conduct disorders) in adolescents at risk of developmental language disorder.
- Specific factors, such as exposure to second-hand smoke, harsh discipline practices, and gender differences, predicted specific manifestations of mental health difficulties in adolescents at risk of DLD.
- In adolescents at risk of DLD, as the number of exposed risk factors up to the age of five increases so does the severity of the mental health difficulties. This is similar to typically developing children.
- Using the findings, it may be possible for professionals to identify those in this population who may be more vulnerable to mental health difficulties in later life, before the age of five.

# INTRODUCTION

Mental health difficulties are common during childhood and adolescence. Young people with developmental language disorder (DLD) are disproportionately affected by such difficulties (Conti-Ramsden et al., 2013; Yew & O'Kearney, 2015). However, not all young people with DLD are affected equally—whilst some suffer from poorer mental health compared to their typically developed peers, others do not experience any mental

health disadvantages (Conti-Ramsden et al., 2013). Investigating why individual differences occurs is likely to be helpful in the early identification and prevention of those young people with DLD who are at risk of developing mental health difficulties. In this paper, data from a population-based cohort study were used to investigate which early life risk factors may predict mental health difficulties during adolescence, for young people at risk of DLD.

## DLD

DLD is characterised by severe and persisting difficulties in oral language, in the absence of a known biomedical cause (Bishop et al., 2017). Approximately 7% of children have DLD within the UK (Norbury et al., 2016). A diagnosis of DLD is not dependent on non-verbal ability. DLD is a relatively new term (Bishop et al., 2016) and has been coined in an attempt to replace terms such as specific language impairment (SLI), language impairment (LI), developmental dysphasia or aphasia. The reasoning behind the newly coined term was to address the inconsistency issue amongst the previous literature. Bishop et al.'s (2016) research consisted of gathering expert opinions from professionals and practitioners within the field to discuss and determine the most appropriate terminology for young people experiencing severe and persisting language difficulties with no known biomedical cause. Despite some disagreement, it was concluded that the term DLD was the most appropriate term to adopt.

## Mental health

Mental health difficulties can take many forms. Diagnostic criteria like the DSM-5 (American Psychiatric Association, 2013) refer to discrete psychiatric conditions, for example major depressive disorder and generalised anxiety disorder. However, not all combinations of symptoms that individuals experience fit neatly into a diagnostic criterion—some symptoms manifest across diagnostic categories. This has led researchers to consider a symptom-based transdiagnostic approach to mental health difficulties (Dalgleish et al., 2020). Symptoms of internalising (such as, anxiety and depression) and externalising problems (such as, conduct problems and hyperactivity) reflect an underlying psychopathology factor (Patalay et al., 2015). This suggests that a diverse range of mental health difficulties can be viewed as a manifestations of a common underlying vulnerability (Sallis et al., 2019). For instance, internalising problems refer to difficulties that are primarily expressed or inflicted internally. Internalising problems are predictive of mood-related disorders, such as anxiety and depression (Côté et al., 2009; Khan et al., 2005; Mesman et al., 2001; Mesman & Koot, 2001). On the contrary, externalising

problems refer to difficulties that are expressed behaviourally. Externalising problems are predictive of conduct disorder or attention-deficit/hyperactivity disorder (ADHD) (Mesman et al., 2001; Mesman & Koot, 2001; Reef et al., 2011). Hence, individuals difference exists in how underlying psychopathology may manifest and it is also possible for an individual to experience both internalising and externalising manifestations of an underlying psychopathology.

Mental health difficulties in young people likely predicts not only mental health disorders in later life (Fairchild et al., 2011; Paus et al., 2008), but also poorer educational attainment (Matthews et al., 2022; Wickersham et al., 2021) and employment outcomes (Hale et al., 2015). An explanation is that adolescence is a complex and significant physical and psychological transitional developmental stage in an individual's lifespan (Fairchild et al., 2011; Paus et al., 2008). Alongside neurobiological and hormonal changes, adolescence is a crucial period for developing independence, establishing friendships and self-identity formation (Albarello et al., 2018; Hay & Ashman, 2003; Roach, 2018; Spear & Kulbok, 2004; Steinberg & Morris, 2001). Disruptions in this transition may lead to a poor social, emotional, and, or behavioural functioning in adulthood and as a result, adolescence is a sensitive time for greater vulnerability to experience psychopathology (Fairchild et al., 2011; Paus et al., 2008). It is unsurprising, therefore, that previous research investigating DLD and mental health has focused on this sensitive developmental period (Botting et al., 2016; Conti-Ramsden & Botting, 2008; Durkin & Conti-Ramsden, 2010).

## DLD and mental health

Young people with DLD are more likely to experience mental health difficulties compared to those without DLD. This is true at a diagnostic level (Cantwell & Baker, 1987), and also, at a symptom level, whereby young people diagnosed with DLD are more likely to experience greater severity of emotional problems, for example, compared to their typically developing peers (Yew & O'Kearney, 2013). There are, however, considerable individual differences in the mental health difficulties experienced by young people with DLD. One study reported that 11% of young people with DLD experienced very few or no emotional or peer problems between age 7 and 14 years (Conti-Ramsden et al., 2019). In the same cohort, 30% experienced very few or no conduct problems or symptoms of hyperactivity (Pickles et al., 2016). Therefore, it is likely that within a group of young people with DLD some experience more mental health difficulties than others, as well as the type of difficulties experienced are like to vary across these young people.

Furthermore, there is limited evidence of the *predictors* of mental health difficulties in young people with DLD.

A large body of research has investigated behavioural correlates of mental health difficulties in young people with DLD. These include peer problems, bullying victimisation and maladaptive emotional regulation strategies (Forrest et al., 2018; Kilpatrick et al., 2019; St Clair et al., 2019), that are all associated with higher levels of internalising problems in young people with DLD. Whilst informative, many of these studies focus on correlates during childhood and beyond. The importance of early life on the subsequent development of mental health difficulties is under-researched.

The importance of the first few years of life on later mental health difficulties has seldom been investigated in young people with DLD. There are, however, some exceptions. A study by St Clair et al. (2019) found that, in children at risk of DLD, infant temperament, parent mental health and the parent–child relationship in the first 3 years of life, predicted emotional difficulties at age 11 years. These findings suggest that early life experiences may be important for the later mental health of children with DLD. However, more research is needed to determine if there are any other potential predictors of mental health difficulties in young people with DLD. This includes factors that have been identified as early risk factors for typically developing individuals but have yet to be investigated in young people with DLD. This includes smoking during pregnancy (Linnet et al., 2003), presence of physical illness (Westerhof & Keyes, 2010), harsh discipline practices (Clayborne et al., 2021) and second-hand smoke (Padrón et al., 2016).

Additionally, the manner in which early risk factors operate remains unclear. In typically and atypically developing children, early risk factors for mental health difficulties may operate cumulatively (Hoover & Kaufman, 2018), an idea proposed by the cumulative risk hypothesis (CRH) (Rutter, 1979). The CRH posits that an increase in the number of risk factors may predict greater severity of adverse outcomes, such as mental health difficulties. The increase in severity may be proportionate (linear) or disproportionate (quadratic) with each risk exposure (Hebron et al., 2017; Jirek & Saunders, 2018; Lamela et al., 2018; Patwardhan et al., 2017). Rutter (1979) stated that the CRH may better predict mental health difficulties through the number of risk factors, rather than the severity of an individual factor. The CRH, despite criticisms, has support (Appleyard et al., 2005; Raviv et al., 2010; Horan and Widom, 2015; Oldfield et al., 2015) and suggests that it may be possible to predict which young people are at high risk of developing mental health difficulties by the number of risk factors to which they are exposed too. Therefore, understanding the role of cumulative risk in the development of mental health difficulties, may help determine which young people are in the greatest need of mental health support or intervention. The cumulative risk hypothesis has not previously been investigated with reference to mental health in young people with DLD.

## Aims

In this study, we aimed to understand whether and how early risk factors are associated with adolescent mental health outcomes, in young people at risk of DLD. The research questions were as follows:

Research Question 1: which early life risk factors predict greater severity of mental health difficulties during adolescence for young people at risk of DLD.

Research Question 2: do the identified early risk factors for mental health operate in a cumulative manner to predict adolescent mental health outcomes for young people at risk of DLD.

## METHOD

### Design

#### Data set used

Secondary analysis of existing data were carried out, using data from the United Kingdom based Millennium Cohort Study (MCS, Connelly & Platt, 2014). The MCS is an ongoing longitudinal research study that follows the lives of approximately 19,000 children born in the United Kingdom between 2000 and 2002. See (Plewis, 2007) and https://cls.ucl.ac.uk/cls-studies/millennium-cohort-study/ for full sampling details. Eligible families were identified using universal benefit records; families either in or out of employment, who receive a payment to reduce poverty. The child and their parents or carers were recruited to the study when the child were 9 months old and were subsequently followed-up at age 3 years, 5 years, 7 years, 11 years and 14 years. A mix of data collection methods were used, including parent-report or self-report questionnaires, direct assessments of the child by trained researchers. In this study, data were collected when the child were 9 months to 5 years old were used to identify early-life risk factors (see 'Measures of risk') for general mental health difficulties, internalising and externalising problems. Data collected at age 14 was used as an indicator of the young person's mental health (see 'Measures of mental health'). The data set has been used in previous investigations of young people at risk of DLD (rDLD, Forrest et al., 2018; St Clair et al., 2019; Toseeb & St Clair, 2020).

### Participants

#### Identifying the children rDLD in the MCS

Firstly, it should be noted that there were no measures or items included during the design of MCS to identify young people diagnosed with or suspected to have DLD. Instead, and similar to previous investigations

using data collected by the MCS (Forrest et al., 2018; St Clair et al., 2019; Toseeb & St Clair, 2020), a step-by-step process was used to identify young people rDLD (see Figure 1). At age five young people were categorised as rDLD if they scored >1.5 *SD* below the MCS population mean on The British Ability Scales' Naming Vocabulary Subtest (Elliot et al., 1996), in the absence of certain biomedical conditions. The total score from the British Ability Scales' Naming Vocabulary subtest was used as proxy measure of lexical retrieval ability (Glaser, 1992; Herbert et al., 2008). Children are shown pictures of objects and asked to name them in English. At the age of the five the Naming Vocabulary subtest has a reliability coefficient of 0.65 (Elliot et al., 1996). This subtest was the only standardised language test data collected in the MCS. Children who scored more or equal to 1.5 *SD* below the mean were categorised as rDLD. As acknowledged by Bishop et al. (2016), there is likely no clear cut-off to differentiate severe language difficulties to

individual differences in typically developing language ability; and there has been continued discussion around the most suitable cut-off for researchers to adopt if a cut-off is required (Spencer et al., 2012). The current study used the same cut-off adopted amongst previous rDLD investigations research using data collected by the MCS to define children with language difficulties (St Clair et al., 2019; Toseeb & St Clair, 2020), which also adheres to the cut-off recommended by Spencer et al. (2012). Followed by the inclusion criteria, an appropriate exclusion criterion was adopted. At age five, 477 children who identified as those rDLD, and out of those, 281 had mental health scores at age 14. A detailed summary of the process of selecting young people identified as rDLD is shown in Figure 1.

It is important to state that the inclusion criteria differ slightly from previous investigations selecting samples of young people who were identified as rDLD. Alongside standardised language measures, previous
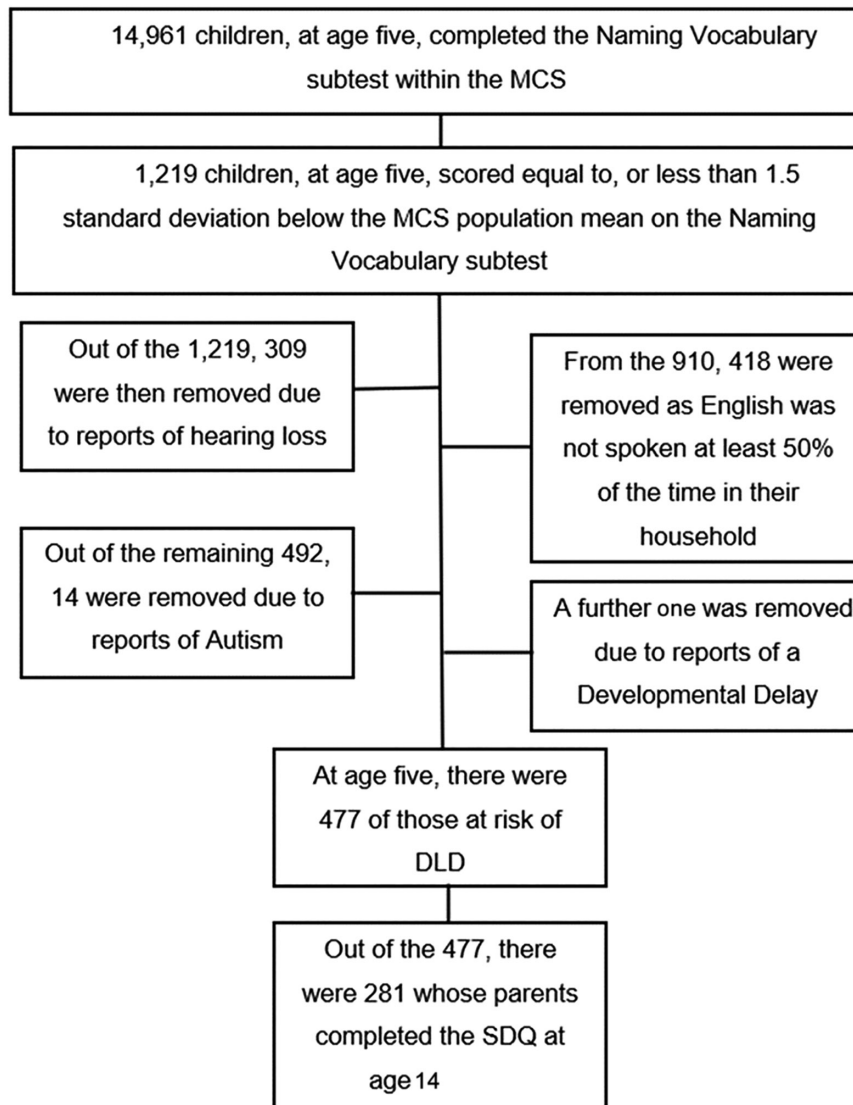


**FIGURE 1** Summary of the sample selection from data collected by the MCS.

investigations using data collected by the MCS have included parents reports to select young people with rDLD (St Clair et al., 2019; Toseeb & St Clair, 2020). Although parent reports provide valuable insights into children's language difficulties and development (Bishop & McDonald, 2009), the current investigation does not include parent reports. Due to the nature of the parent reports as collected by the MCS it is not clear as the type of language difficulties exhibited by the children. It has been deemed useful to practitioners for researchers to include a clear description of the language difficulties experienced amongst the sample investigated (Botting et al., 2016). It may be particularly important when understanding the relationship between language and mental health it is evidenced that certain language difficulties may predict specific manifestations of mental health difficulties (Snowling et al., 2006). Therefore, parent reports were not adopted in the inclusion criteria for the current investigation as, without a practitioner's expertise, it is uncertain as to what language difficulties would be present in the sample. As a result, it is known that the select sample are likely to experience (noun) lexical retrieval difficulties; this knowledge may be useful for practitioners.

Additionally, a comparison group was not selected for the current investigation when identifying early risk factors for mental health difficulties in early adolescence. Due to the limited language measures adopting in the MCS, it might not have been possible to select a sample that, with confidence, could be known as young people without the risk of DLD, otherwise referred to the 'general population'.

## Sample demographics

There were 281 young people rDLD who were included in this analysis. This consisted of 127 (45%) females and 154 (55%) males which is consistent with the sex differences reported in children diagnosed with DLD; as males are more likely to be diagnosed with DLD compared to females (Chilosi et al., 2023). One hundred and fifty (53%) were reported to be living in poverty (defined as below 60% of the median United Kingdom income). The majority of the sample were White ($n = 149$, 53%). Lastly, at age 14, one young person within the sample also reported that they spoke another language (Welsh).

Preliminary investigations were performed to further understand the selected sample: 'young people rDLD' (see Appendix S1). A general population sample was created to compare additional cognitive difficulties (specifically problem-solving difficulties) as well as mental health difficulties in young people rDLD. For cognitive difficulties, tests of group comparison revealed that in addition to lexical retrieval difficulties, young people rDLD (as selected in the current investigation) were more likely to experience problem-solving difficulties

at age five and seven, compared to the general population (see Table S2). For mental health difficulties, tests of group comparison revealed that young people rDLD (as selected in the current investigation) were more likely to experience worse general mental health difficulties, as well as internalising and externalising problems at age 14, compared to the general population (see Table S3). Caution is required for interpreting these results as the general population is likely to contain individuals diagnosed with DLD but have not selected in the current study, as well as individuals diagnosed with neurodevelopmental disorders associated with language difficulties such as autism and Down's Syndrome (see Appendix S1).

## Measures selected from the Millennium Cohort Study

## Measures of mental health difficulties

Parents or carers of children in the MCS cohort were asked to complete the parent-report version of the Strengths and Difficulties Questionnaire (SDQ: P4-17, Goodman, 1997) when their child was 14 years old. The SDQ is a valid and reliable screening tool for identifying childhood and adolescent mental health difficulties (Goodman et al., 2011; Johnson et al., 2014; Kovacs & Sharp, 2014). The SDQ contains 25 items, divided into five subscales, each consisting of five items. Four of the five subscales are 'problem' based subscales ('emotional problems', 'peer problems', 'conduct problems' and 'inattention and, or hyperactivity'), whereas the fifth subscale is a positive subscale assessing prosocial behaviour. Items in the problem subscales asks parents or carers to rate the degree to which they agree that their child is, for example, 'considerate of other people's feelings' and 'restless, overactive, cannot stay still for long'. In this study, the sum of scores on the four problem subscales were summed to create the 'total difficulties' score; whereby, higher scores suggest greater severity of general mental health difficulties. The total difficulties score is likely to reflect symptoms of a broad range of mental health problems that the child or adolescent may experience (Goodman, 2001). In the current sample, the internal validity of the items that equate to the total difficulties score was high ($\alpha = 0.86$).

Additionally, the scores of the SDQ were also used to measure the two manifestations of mental health difficulties: internalising and externalising problems. Scores on emotional and peer problems subscales were summed to create a measure of internalising problems and summed scores on conduct and hyperactivity were used to create a measure of externalising problems. The higher scores indicate greater severity of internalising or externalising problems. In the current sample, the internal consistency of internalising problems and externalising problems items were high (respectively, $\alpha = 0.75$, $\alpha = 0.83$).

## Measure of early risk factors

Data relating to several early life risk factors were extracted from parent or carer report questionnaires, completed when the child was approximately aged 9 months, 3 years or 5 years. These are described below. It is important to note that some measures selected for the current investigation were not consistently used across all three waves of the MCS (aged 9 months, 3 years or 5 years) and therefore, the latest available data up to the age of five was selected for the present study.

*Severity of lexical retrieval difficulties.* In addition to identifying young people as those identified as rDLD in the current study the severity of the difficulties in lexical retrieval ability at age five may contribute to the severity of mental health difficulties at age 14. The severity of difficulties in lexical retrieval ability was assessed by the Naming Vocabulary subtest from the British Ability Scales II (Elliot et al., 1996), which was described previously.

*Smoking during pregnancy.* When the child was 9 months old birth mothers were asked to report the number of cigarettes smoked during pregnancy. The responses that reported a number more than zero for both questions were used to indicate that the mother had smoked during pregnancy.

*Child physical illness.* When the child was 5 years old parent or carers were asked 'Does [child] have any long-standing illness, disability or infirmity? By longstanding I mean anything that has troubled [child] for a period of time or is likely to affect [child] over a period of time'. The responses were 'yes' or 'no'.

*Child's sex.* Parents were asked to report their child's biological sex when the child was 5 years old. Responses were binary: 'Female' or 'Male'.

*Parent or carer mental health.* Parents or carers reported on their own mental health when the child was 5 years old using the Kessler 6 psychological distress scale (Kessler et al., 2002). The scale consists of six items for example: 'During the past 30 days, about how often did you feel…', which included 'nervous?', 'worthless?'. Responses were coded on a five-point Likert scale. Higher scores indicated higher levels of psychological distress. The scale had good reliability in this sample ($\alpha = 0.88$).

*Parents or carers physical illness.* Parents or carers reported on whether they had any physical illness using the modified Short Form-8 (SF-8) scale (Ware et al., 2001) when the child was 5 years old. It is important to note that due to the timeframe of the questions, it is uncertain if worse physical health as assessed by the SF-8 is due to a chronic or short-lived illness. The scale consists of eight items. Items include, for example, '(During the past 4 weeks), how much difficulty did you have doing your usual work, college or other daily activities because of your physical health?'. Responses on three items relating to the parent or carers' emotional difficulties were

not included, as this would lead to an autocorrelation with the other potential predictors measures (Kessler-6 scores). Responses varied across the remaining items as some responses consisted of a five-point Likert scale, whilst others were six-point Likert scales. Scores of the items were reversed where appropriate and all scores were standardised before adding together to create a composite score. Higher scores indicated worse physical health of the main caregiver. Despite removing the three items relating to emotional difficulties and consisting of varying responses, the scale had high reliability in this sample ($\alpha = 0.81$).

*Harsh discipline.* Parents or carers completed the Parent–Child Strauss Conflict Tactics Scale (Straus & Hamby, 1997) when the child was 5 years old. This scale focuses on intrafamilial conflict and violence specifically between the parent and their child. This includes the degree to which harsh discipline practices are used by the parent such as ignoring, spanking and, or hitting the child as a form of publishment. A sample question includes 'How often do you [ignore him/her/them] when the [child] is naughty'. Responses were coded on a five-point scale, and higher scores indicated indicates greater harsh discipline practices. The scale had good reliability in this sample ($\alpha = 0.71$).

*Parent–child conflict.* Parents or carers completed the Child–Parent Relationship Scale (Pianta, 1992) when the child was 3 years old. The conflict subscale included items such as 'dealing with [child] drains my energy'. Responses were coded on a five-point Likert scale, and higher scores indicated indicates greater parent–child conflict. The scale had good reliability in this sample ($\alpha = 0.79$).

*Parent–child closeness.* Parents or carers completed the Child–Parent Relationship Scale's Closeness subscale (Pianta, 1992) when the child was 3 years old. Closeness here broadly refers to a parent–child relationship embedded with open and honest communication, acceptance, care and warmth (Driscoll & Pianta, 2011). The Closeness subscale included items such as 'I share an affectionate, warm relationship with my child'. Responses were coded on a five-point Likert scale, and higher scores indicated greater parent–child closeness. The scale had good reliability in this sample ($\alpha = 0.70$).

*Parental engagement.* Parents or carers were asked six questions regarding parental engagement with their child, when they were 5 years old. Items include 'how often do you tell stories to the [child]?' and 'How often do you draws/paints with the [child]'. Responses were coded on a six-point Likert scale, and scores were summed together to create a total score. A lower total score indicated greater parental engagement. The scale had good reliability in this sample ($\alpha = 0.71$).

*Poverty.* Parents or carers were asked to report household income from all sources (e.g., main job, government benefits etc.). This was assessed and standardised using the modified Organisation for Economic Co-operation

and Development scale (Hagenaars et al., 1994). Families whose incomes were below 60% of the median income level were categorised as those living in poverty (Francis-Devine, 2022; McGuinness, 2018).

*Single parenthood.* Parents or carers were asked to complete multiple questions about other members of the household, when the child was 5 years old. One of the questions asked for the number of carers and, or parents that are currently living in the household. The response was 'one carer/parent' was used to indicate single parenthood.

*Second-hand smoke.* Parents or carers were asked 'whether anyone smokes in the same room as child' when the child was 5 years old. If the response was 'yes', then this was used to indicate that the child had been exposed to second-hand smoke.

## Data analysis

All data analyses were performed in STATA/MP 12.0 (StataCorp., 2011). Only participants rDLD were included in this analysis. Three multiple regressions were performed to determine if the potential factors indeed predicted either higher SDQ total difficulties scores; internalising scores; or externalising scores. Yet, factors were only included in the regression if they were revealed to have a significant association to the outcome. Potential early risk factors (<5 years) for mental health difficulties (age 14 years) were identified using a series of correlations and test of group difference (exposure to risk or not) where appropriate. Once the significant predictors were identified in single variable models (correlations or test of group difference), these were then tested in multivariate regression models.

Secondly, significant early risk factors as identified in the regression models were then remodelled to test the cumulative risk hypothesis. Factors that were revealed to be insignificant in the regression models were not used to test the cumulative risk hypothesis. Using the significant early risk factors only, first a total risk score was generated by the researcher as follows: The presence of a risk factor for each child was coded as 1 and the absence was coded as 0. Continuous variables were standardised and then dichotomised. Specifically, for all continuous variables, higher scores indicate greater risk, and so, scores above the upper quartile (75%) were taken to indicate risk exposure. This cut-off is recommended (Appleyard et al., 2005; Evans et al., 2013; Evans & Cassells, 2014; Hebron et al., 2017).

Once coded by the researcher, scores were then summed to create a 'total risk' score. The 'total risk' score was used to test the linear effect between the risk factor and mental health difficulties. In addition to the total risk score, a quadratic score was generated by squaring the total risk score for each individual (quadratic effect). The approach used to create the quadratic term is recommended by Aiken et al. (1991) and practised in cumulative risk research (Hebron et al., 2017; Oldfield et al., 2015). These risk scores were then entered into hierarchical regression models. In the first step, total risk score was entered as the predictor variable. In the second, the quadratic score was entered into the model.

## Testing assumptions

Prior to fitting any models, a number of assumptions were tested. All three of the outcome measures (total difficulties, internalising problems and externalising problems) violated the normal distribution assumption. Therefore, non-parametric tests of association were used (Spearman's Rho and Mann–Whitney $U$). In addition to this, assumptions for regression models were tested. Due to violations to the regression modelling, the robust option was used. Evidence of multicollinearity was tested between all the potential risk factors. Chi-squared tests revealed that in poverty and main caregiver's unemployment were associated ($X^2 = 87.72$, $p < 0.001$). Also, the results from the Variance Inflation Factor detected the presence of multicollinearity between single-parenthood and the main caregiver's unhappiness in relationships. Therefore, main caregiver's employment status and main caregiver's unhappiness in relationships were removed from future analysis as potential risk factors, and hence, were not described earlier.

## Missing data

Little's (1988) test was conducted to determine whether mental health data at age 14 years were missing at random. According to the results of the Little's test, the data for Strengths and Difficulties scores were likely to be missing at random. Missingness was dependent on household income—those living in poverty were more likely to have missing data.

## RESULTS

Descriptive analyses were first performed to determine the mean SDQ scores (total difficulties, internalising and externalising problems) at age 14, in those selected as being at risk of DLD (rDLD, $n = 281$). In those rDLD, for total difficulties scores, the mean was 9.98 (SD = 6.55) and the range of scores was 0–34. For internalising scores, the mean was 4.58 (SD = 3.54) and the range of scores was 0–14. For externalising scores, the mean was 5.39 (SD = 3.93) and the range of scores was 0–20.

The associations between individual risk factors and mental health outcomes were then tested in three separate

sets of analyses (total difficulties, internalising problems and externalising problems). Pairwise correlations and tests of group difference between early risk factors and mental health at age 14 years are shown in Table 1.

## Total difficulties

As shown in Table 1, greater severity of language difficulty, living in poverty, exposure to second-hand smoke, single parenthood, parent or carer's mental health, parent or carer's physical illness, harsh discipline practice, parent–child conflict, lack of parent–child closeness and lack of parental engagement were associated with higher total difficulties scores at age 14 years. These significant predictors were entered into a multiple regression model with total difficulties as the dependent variable. The regression model was significant ($F(10, 143) = 3.57$, $p = 0.001$), with a R-square ($R^2$) of 20%. The following main effects were significant: parent–child conflict (unstandardised $B = 0.20$, standardised $\beta = 0.18$, $p < 0.05$); harsh discipline (unstandardised $B = 0.28$, standardised $\beta = 0.20$, $p < 0.05$). This suggests that parent–child conflict and harsh discipline in the first 5 years of life are risk factors for mental health difficulties at age 14 for those rDLD.

## Internalising problems

As shown in Table 1, greater severity of parent or carer adverse mental health, parent or carer physical illness, parent-–child conflict, and being female were all associated with higher internalising scores at age 14 years. These significant predictors were entered into a multiple regression model, with internalising problems as the dependent variable. The regression model was significant ($F(4, 168) = 4.00$, $p < 0.05$), with a $R^2$ of 9%. The following main effects were significant: parent-–child conflict (unstandardised $B = 0.09$, standardised $\beta = 0.16$, $p < 0.05$) and being female (unstandardised $B = 1.24$, standardised $\beta = 0.17$, $p < 0.05$). This suggests that parent-–child conflict in the first 5 years of life and being female are risk factors for internalising problems at age 14 for those rDLD.

## Externalising problems

As shown in Table 1, parent or carer's mental health, living in poverty, second-hand smoke, single parenthood, parent–child conflict and lower parent–child closeness were associated with higher externalising problems score at age 14 years. These significant predictors were entered

**TABLE 1** Summary of the pairwise correlations and tests of group difficulties between early risk factors and mental health outcomes at age 14.

| Potential early risk factors | Test | Total difficulties score | Internalising score | Externalising score |
|---|---|---|---|---|
| Prenatal condition | | | | |
|   Smoking | $T$-test | $z = 0.61$ | $z = 0.34$ | $z = 0.86$ |
| Individual factors | | | | |
|   Severity of language difficulty | Correlation | $-0.13^*$ | $-0.11$ | $-0.10$ |
|   Child physical illness | $T$-test | $z = 0.53$ | $z = 0.61$ | $z = 0.53$ |
|   Child's gender[1] | $T$-test | $z = 1.02$ | $z = 2.10^*$ ($V = 0.27$) | $z = 0.12$ |
| Family factors | | | | |
|   Parent or carer mental health | Correlation | $0.25^{***}$ | $0.23^{***}$ | $0.20^{**}$ |
|   Parent or carer physical illness | Correlation | $0.14^*$ | $0.14^*$ | $0.10$ |
|   Harsh discipline | Correlation | $0.19^{**}$ | $0.12$ | $0.21^{***}$ |
|   Parent–child conflict | Correlation | $0.29^{***}$ | $0.22^{**}$ | $0.27^{***}$ |
|   Parent–child closeness | Correlation | $-0.16^*$ | $-0.09$ | $-0.18^*$ |
|   Parental engagement | Correlation | $-0.13^*$ | $-0.11$ | $-0.11$ |
| Home environment | | | | |
|   Poverty | $T$-test | $z = 2.18^*$ ($V = 0.24$) | $z = 1.77$ | $z = 1.98^*$ ($V = 0.24$) |
|   Single parenthood | $T$-test | $z = 2.66^{**}$ ($V = 0.33$) | $z = 1.86$ | $z = 2.95^{**}$ ($V = 0.38$) |
|   Second-hand smoke | $T$-test | $z = 2.74^{**}$ ($V = 0.42$) | $z = 1.36$ | $z = 3.59^{***}$ ($V = 0.05$) |

[1]The mean (and standard deviation) for females' total difficulties score was 10.51 (6.78); for the internalising problems score the mean was 5.11 (3.71); for externalising problems score the mean was 5.40 (3.30). The mean for males' total difficulties score was 9.53 (6.34); for the internalising problems score the mean was 4.15 (3.34); for the externalising problems score the mean was 5.38 (3.97).

*Note*: $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$; Cramer's V ($V$) was performed to determine the effect size of significant $t$-test results.

into a multiple regression model with externalising problems as the dependent variable. The regression model was significant ($F_{(7,146)} = 5.48$, $p = 0.001$), with a $R^2$ of 22%. The following main effects were significant: parent–child conflict (unstandardised B = 0.17, standardised $\beta = 0.25$, $p < 0.01$); second-hand smoke (unstandardised B = 2.13, standardised $\beta = 0.22$, $p < 0.01$); harsh discipline (unstandardised B = 0.22, standardised $\beta = 0.03$, $p < 0.05$). This suggests that parent–child conflict, second-hand smoke and harsh discipline in the first 5 years of life are risk factors for externalising problems at age 14 for those rDLD.

## Cumulative risk

After identifying key predictors of general mental health difficulties, internalising problems and externalising problems, a total risk score was created for each young person in the sample. Young people rDLD who were exposed to two or three risk factors were merged into a single group ('those with two or more risk factors'), because of the small sample size of those who were exposed to three risk factors ($n < 20$). A small size sample could reduce the statistical power and consequently impact the accuracy of the results. Therefore, those with two risk factors and those with three risk factors were merged into one group: 'those with two or more risk factors'. This resulted in a cumulative risk score of 0, 1, 2 or more. For general mental health difficulties (total difficulties), 197 had no risk factors ($M = 9.24$, $SD = 6.20$), 76 had one risk factor ($M = 11.33$, $SD = 7.01$) and eight had two or more risk factors ($M = 15.5$, $SD = 6.82$). For internalising problems, 129 had no risk factors ($M = 4.04$, $SD = 3.33$), 125 had one risk factor ($M = 4.91$, $SD = 3.67$) and 27 had two or more risk factors ($M = 5.67$, $SD = 3.56$). For externalising problems, 155 had no risk factors ($M = 4.45$, $SD = 3.34$), 95 had one risk factor ($M = 6.05$, $SD = 3.88$), and lastly, 31 had two or more risk factors ($M = 8.10$, $SD = 5.11$). In addition to the total risk score, a quadratic term was also created for each young person identified as rDLD by squaring the total risk score.

Three hierarchal regression models were fitted, each with a different outcome (total difficulties, internalising problems or externalising problems). In all three models, the overall model in the first step was significant (total difficulties ($F_{(1, 279)} = 10.18$, $p < 0.01$, $R^2 = 4\%$), internalising problems ($F_{(1, 279)} = 6.98$, $p < 0.01$, $R^2 = 2\%$) and externalising problems ($F_{(1, 279)} = 21.57$, $p < 0.001$, $R^2 = 9\%$)). The main effect of total number of risks in all three models were significant (total difficulties (unstandardised B = 2.40, standardised $\beta = 0.19$, $p < 0.01$), internalising problems (unstandardised B = 0.84, standardised $\beta = 0.15$, $p < 0.01$) and externalising problems (unstandardised B = 1.76, standardised $\beta = 0.31$, $p < 0.001$)). For all three models, when the quadratic terms were introduced in the second step, the variance between the first and second

step did not change significantly total difficulties ($R^2$ change = 0.002, $F_{(1,278)} = 0.44$, $p = 0.51$), internalising problems ($R^2$ change = 0.001, $F_{(1,278)} = 0.02$, $p = 0.90$) and externalising problems ($R^2$ change = 0.001, $F_{(1,278)} = 0.17$, $p = 0.68$). This suggests that early life risks for mental health difficulties at age 14 operate in a linear manner— as the number of risks a child is exposed to in the first 5 years of life increases, so does the severity of total difficulties, internalising problems and externalising problems at age 14 years.

## DISCUSSION

This study focussed on the early risk factors for adolescent mental health difficulties, in young people rDLD. There were some common and unique risk factors across the different types of mental health difficulty measured (general mental health difficulties, internalising problems or externalising problems). The risk factor that occurred across more than one outcome (general mental health difficulties, internalising problems, and, or externalising problems) was high level of parent–child conflict and discipline practices. Specifically, greater parent–child conflict significantly predicted higher scores on all three outcomes. Discipline practices significantly predicted worse general mental health difficulties and externalising problems, but not internalising.

Unique factors were second-hand smoke (for externalising problems only) and being female (for internalising problems only). Additionally, the risk factors for the various types of difficulty operated in a cumulative manner. The greater the number of risk factors a young person identified as rDLD were exposed to in the first 5 years of life, the more severe the general mental health difficulties, internalising problems and externalising problems, they were likely to experience during adolescence.

### Early risk factors for adolescent mental health difficulties

Several early life risk factors for adolescent mental health difficulties were identified, including factors not yet identified in the previous literature. Firstly, parent–child conflict was a significant predictor of adolescent mental health across all types of mental health difficulties investigated. This includes increasing the likelihood of developing symptoms of depression and anxiety (internalising problems), as well as conduct disorder, and hyperactivity and inattention (externalising problems). There may be multiple plausible explanations as to why high levels of parent–child conflict is an early risk factor for mental health difficulties, in young people rDLD. Firstly, whilst parental stress may play a role (Bayer et al., 2006), research suggests that children diagnosed with DLD may have difficulties using effective conflict resolution

strategies (Marton et al., 2005). The effectiveness of the conflict resolution strategies, in children diagnosed with DLD, may be further hindered by their demonstrated difficulty in detecting conflict within social situations (Epstein et al., 2014). Conflict resolution and detection difficulties may reduce the child's ability to manage adverse, or stressful social interactions or situations. The difficulty in managing such situations may increase feelings of stress and frustration as well as low self-esteem that stems from unmanaged or unresolved conflict; especially, if this occurs over a long period as evidence in the general populations (Kindsvatter & Desmond, 2013; Marmorstein & Iacono, 2004; Peng et al., 2021; Smith et al., 2019; Weaver et al., 2015). The current investigation is the first to demonstrate that, as a consequence of the high level of unresolved, and perhaps continuous, conflict between the child and the parent, this may increase the likelihood of both internalising and externalising difficulties in these young people.

Additionally, parent–child conflict is likely to be a proxy for a number of other risk factors, some of which were investigated here and were significant in the first step of the analysis. Engaging in conflict is likely to be dependent on the child's temperament, the child's genetics, the parent's genetics, parent mental health, single parenthood and household income (Conger et al., 2010; Conger & Elder, 1994). Indeed, the family stress model (Conger et al., 2010; Conger & Elder, 1994) posits that socio-economic pressures can impact upon parent–child relationships, which in turn affect the child's mental health difficulties. Further research is needed to elucidate these and test the mechanisms by which these factors affect mental health. These data may suggest that, if these associations are causal, early interventions targeted at parent–child relationships in children with DLD may be beneficial for improving adolescent mental health outcomes as evidenced in the general population (Kindsvatter & Desmond, 2013; Weaver et al., 2015). Further research is needed to determine if current interventions that aim to address parent–child conflict are effective and suitable for children diagnosed with DLD.

Contrary to expectations, parent–child closeness was not an early risk factor for mental health difficulties in young people rDLD (in the final models). It was expected that both parent–child conflict and closeness would predict adolescent mental health difficulties. These predictions were based on previous work by St Clair et al. (2019) who found that the lower quality of parent–child relationship, as a combination of greater conflict and a closeness, was an early risk factor for emotional difficulties. In this study, however, closeness was not found to be a significant predictor for any of the outcomes (in the final models), whereas conflict was found to be a significant risk factor for all three. Therefore, it may be that having positive parent–child interactions are not necessary for good adolescent mental health, but negative parent–child interactions are detrimental. This is not

necessarily in line with what would be expected based on current knowledge about early developmental processes. Affective attunement refers to the dyadic interactions between child and caregiver, whereby the caregiver recognises and responds to the child's emotional expression (Stern, 1985). In turn, the child learns to regulate their emotions, a process which has been shown to be an important predictor of mental health difficulties in young people with DLD (St Clair et al., 2019). These nuances of the association between early parent–child interactions and adolescent mental health in young people with DLD should be the focus of future research in order to fully understand the mechanisms through which they exert their influence.

Higher reports of harsh discipline practices were an early risk factor for mental health difficulties and externalising problems, at age 14. This finding was not unexpected. Previous research indicates that reports of high-level harsh discipline practices, which is associated with abuse (Zolotor et al., 2008), has a detrimental effect on young people's mental health development (Regalado et al., 2004; Slade and Wissow, 2004; Afifi et al., 2017). Yet, more research is needed to determine why, in young people rDLD, harsh discipline practices are predictive of general mental health difficulties and externalising problems, but not internalising problems. A plausible explanation for this unexpected finding could be due to inclusion of 'active' and 'withdrawal' forms of harsh discipline practices in the current study to assess harsh discipline practices. Active harsh discipline practices included items such as smacking, shouting and telling off the child. Withdrawal items included ignoring the child, removal of their privileges and sending the child to their bedroom. An MCS investigation to understand harsh discipline practices and child mental health in the general population by Rajyaguru et al. (2019) found that the active approach was associated with emotional problems, but this was not revealed for the withdrawal approach. This difference was not found for conduct difficulties. Therefore, as evidenced in the general population, the type of harsh discipline practice, rather than general practices, may be more important to consider in future investigations.

Another plausible explanation could be that internalising difficulties were measures through parent-report measures. Compared to self-reports, parent-reports may be more prone to observer bias as such reports may reflect the parents' subjective perception or assumptions as to how their child may exhibit internalising difficulties. Some parents may underestimate their child's internalising difficulties as the child may not express thoughts or feelings through communication or behaviourally; especially, to parents who regularly enforce harsh discipline practices. It is known that harsh discipline practices, such as ignoring and, or hitting the child, may lead the child to feel insecure with their parent or caregiver (Groh et al., 2012), as a result, the child

may not feel safe to express their thoughts and feelings. This could lead to a lack of convergence between self-reports and parent-reports for internalising difficulties (Borelli et al., 2017; Hughes & Gullone, 2010; Makol et al., 2019). As a result, harsh discipline practices may not be a predictor of internalising problems in early adolescence in young people rDLD due to the use of parent-reports. For now, the findings from the current study highlight the need to understand how harsh discipline practices play a role in the development of mental health in young people rDLD.

Thirdly, females were more likely than males to experience greater severity of internalising problems, at age 14. This finding is unsurprising, as it supports a vast amount of evidence that females are more likely, compared to males, to experience a greater severity of internalising problems (Boyd et al., 2015; Galderisi et al., 2015; Schuch et al., 2014). This includes greater symptom severity of depression and anxiety, compared to males. Surprisingly, however, there were no differences between males and females for externalising problems. This contradicts the existing literature evidencing that in the general population, males are more likely to experience greater externalising difficulties compared to females (Boyd et al., 2015; Galderisi et al., 2015; Schuch et al., 2014). However, the lack of sex differences in externalising difficulties found in the present investigation may provide some explanation as to why previous research has found inconclusive evidence for sex and, or gender effects for mental health difficulties, in young people diagnosed with DLD (Conti-Ramsden & Botting, 2008). A plausible explanation is that females diagnosed with DLD may exhibit greater externalising difficulties compared to typically developing females. Individuals diagnosed with DLD might experience symptoms associated with ADHD and conduct disorder due to the presence of additional cognitive difficulties (Pavelko et al., 2017; Stanton-Chapman et al., 2007; Vissers et al., 2015; Vugs et al., 2013, 2014). For instance, difficulties in executive functioning are known to be present in individuals diagnosed with DLD (Vissers et al., 2015), as well as amongst ADHD and offending populations (Boonstra et al., 2005; Morgan & Lilienfeld, 2000). Yet, further in-depth investigation is needed to determine if the insignificant differences in externalising difficulties across males and females rDLD is due to additional cognitive difficulties.

Lastly, exposure to second-hand smoke, at age five, significantly predicted greater severity of externalising problems at age 14, in young people rDLD. This finding contributes to the complex literature on mental health difficulties and exposure to second-hand smoke. The current findings support the conclusion drawn by Bandiera et al., (2011). Bandiera et al., found that second-hand smoke was associated with conduct problems, as well as inattention and hyperactivity. On the contrary,

Padrón et al. (2016) only found an association between second-hand smoke and, inattention and hyperactivity. The findings drawn from the current investigation suggest that exposure to second-hand smoke may play a role in the development of externalising problems, in young people rDLD. Therefore, in young people rDLD, the findings support the literature around second-hand smoke and externalising problems (including conduct problems).

However, it is uncertain as to why second-hand smoke exposure is an early risk factor for externalising difficulties at age 14 in those rDLD. A plausible explanation may be that neurochemical disruptions as a result of second-hand smoke in early childhood leads to difficulties in behavioural regulation in adolescence as demonstrated in the general population (Griffiths et al., 2005; Kelly & Watt, 2005). Yet, another explanation could be that second-hand smoke mediates the relationship between household and family factors, and externalising problems. There is a wealth of literature demonstrating that smoking behaviours are predictive of low socio-economic status and stress (Crittenden et al., 2007; Finkelstein et al., 2006; Tsourtos et al., 2008; Tsourtos & O'Dwyer, 2008). Further research is needed to understand the mechanism in which second-hand smoke exposure as early as five may result in externalising problems in young people rDLD during early adolescence.

## Cumulative risk for adolescent mental health difficulties

The severity of adolescent mental health difficulties is predicted by the number of early risk factors. These findings make a unique contribution to the literature as they suggest that risk for adolescent mental health difficulties operate in a cumulative manner, for young people rDLD. If causal, this means that intervening to support one area of risk in early life, may have a positive effect on adolescent mental health in young people with DLD (Buehler & Gerard, 2013; Rioux, 2016). Intuitively, these findings suggest intervening to improve one of the early risk factors is likely to have a positive knock-on effect on adolescent mental health difficulties in a proportional manner (if causality can be established), although this needs to be investigated carefully. It is well established that risk factors operate as part of a complex system in which they influence each other (Bronfenbrenner, 1979; Buehler & Gerard, 2013; Rioux, 2016). That is, interventions aimed at reducing parent–child conflict might reduce adolescent mental health difficulties, but they might also reduce concurrent harsh discipline practices. Additional research with a larger sample size is needed to investigate carefully casualty in cumulative risk factors in young people diagnosed with DLD.

## Limitations

Despite the valuable insights drawn from the current investigation, there are several limitations that should be borne in mind. First, the findings may not be generalisable to all young people diagnosed with DLD. The sample in this study may reflect a subsample of young people diagnosed with DLD; specifically, those with difficulties in lexical retrieval ability. It may also be that the rDLD sample includes young people who do not have DLD. Additionally, it is important to note that inclusion criteria for the selected sample 'young people rDLD' in the current investigation does differ from previous MCS studies whereby parent reports were not utilised here. Therefore, caution is advised when comparing findings with previous MCS investigations.

Secondly, beyond preliminary analysis a general population was not included as a comparison group to identify early risk factors for mental health difficulties in adolescences for young people rDLD. Although the findings in the current investigation were discussed in light of previous literature in both DLD and typically developing populations, further research is required to compare early risk factors for mental health difficulties in young people diagnosed with DLD, with those with typical language development to identify factors that are specific to DLD.

The sample size was small given the large number of variables included in some of the models and the number of young people who were exposed to two or more risk factors were small. This may have obfuscated a possible quadratic effect during analysis. Therefore, care should be taken when concluding the nature or form of the cumulative effect claimed.

Another limitation may be the use of parent reports to assess mental health difficulties in young people rDLD. There is some evidence to suggest that parent reports may not align with the scores from self-reports (Gough Kenyon et al., 2021). Parents might understate the mental health difficulties experienced by their children. However, parent-reports were chosen over self-reports as young people with DLD may experience difficulties in understanding or using emotive language (van den Bedem et al., 2020). Given that emotive language is often used in self-report measures of mental health, they may not be appropriate for young people with DLD. This is perhaps one explanation as to why self-reports are underutilised in this field (Conti-Ramsden et al., 2013).

## CONCLUSION

Several risk factors are important in predicting adolescent mental health difficulties in young people rDLD. High levels of parent–child conflict appear to be a particularly important early risk factor as it is likely to predict worse general mental health difficulties, internalising and externalising problems. Another salient risk factor was high levels of harsh discipline as it predicted worse general mental health difficulties and externalising problems. Second-hand smoke predicted worse externalising problems, whereas the child's gender predicted worse internalising problems.

Risk factors within this study operated in a cumulative manner: the greater the number of risk factors a child rDLD is exposed to during the early years, the greater the severity of mental health difficulties, internalising problems and externalising problems experienced during adolescence. These findings have implications as young people rDLD with a greater number of early risk factors, should be identified and introduced to early interventions that aim to reduce the likelihood of developing severe mental health outcomes in adolescence.

## CONFLICT OF INTEREST STATEMENT
The authors declare that there is no conflict of interest.

## DATA AVAILABILITY STATEMENT
Data sharing is not applicable to this article as no new data were created or analyzed in this study.

## ETHICS STATEMENT
Analysis of the pre-existing data received ethical approval from the Manchester Metropolitan University Ethics Committee (EthOS Reference Number: 4327).

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.