The predictors of persistent DSM-IV Disorders in three-year follow-ups of the British Child and

Adolescent Mental Health Surveys 1999 and 2004.

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Abstract

Background

The identification of the factors that influence the persistence of psychiatric disorder may assist practitioners to focus on young people who are particularly prone to poor outcomes, but population-based samples of sufficient size are rare.

Methods

This secondary analysis combined data from two large, population-based cross-sectional surveys in Great Britain (1999 and 2004) and their respective follow ups (2002 and 2007), to study homotypic persistence among the 998 school-age children with psychiatric disorder at baseline. Psychiatric disorder was measured using the Development and Well-Being Assessment applying DSM-IV criteria. Factors relating to the child, family, the severity and type of psychopathology at baseline were analysed using logistic regression.

Results

Approximately 50% of children with at least one psychiatric disorder were assigned the same diagnostic grouping at three year follow up. Persistent ADHD and anxiety were predicted by poor peer relationship scores. Persistent conduct disorder was predicted by intellectual disability, rented housing, large family size, poor family function and by severer baseline psychopathology scores.

Conclusions

Homotypic persistence was predicted by different factors for different groups of psychiatric disorders. Experimental research in clinical samples should explore whether these factors also influence response to interventions.

Key Words: Persistence, psychiatric disorder, ADHD, conduct disorder, anxiety, depression.

Introduction

Understanding the factors that influence the persistence of childhood psychiatric disorder may help practitioners to identify young people who may be at particular risk of poor outcomes and may therefore require altered or more intensive interventions. Population-based samples of children with well-defined psychiatric disorders are commonly limited by the small numbers of children with disorder despite large initial samples, so many epidemiological studies lump all disorders together, and/or lack power to study more than a few potential predictors (Costello & Maughan, 2015). Conversely, studies of clinical samples may over-estimate persistence because children who access services tend to have the most severe and / or persistent difficulties (Angold et al. 2000; Ford et al. 2008). Other studies rely on questionnaire-based assessments of difficulties rather than diagnoses (Van Bokhoven et al. 2005; Nagin et al. 2001), so indicate the persistence of psychopathology rather than disorder, which may not necessarily share all the same influences. These methodological issues in addition to variations in sample characteristics, assessment methods, length of follow up and the application and selection of diagnostic categories have led to considerable variation in reported outcomes (Costello & Maughan, 2015). This area of research is further complicated by potential differences in the definitions of "persistence", which may mean meeting criteria for the SAME diagnosis (homotypic) or OTHER disorders (heterotypic) at follow up. The conceptualization of persistence is particularly problematic for disorders that may have an episodic or relapsing and remitting course, such as anxiety and depression, and may therefore be better conceptualized as recurrent rather than persistent (Costello & Maughan, 2015). A further complication is whether individual diagnosis, such as "separation anxiety disorder" or "agoraphobia", or broad grouping, such as "anxiety disorders", are selected for study. For example, separation anxiety disorder rarely persists into

adult life, while panic disorder rarely develops before adolescence, yet both could be

categorized as anxiety/emotional disorders at a broad level. Decisions about the level and type

of disorder to study will, therefore, greatly influence the level of "persistence" reported. This is

of particular relevance to the study of emotional disorders, where empirical evidence suggests

that there is sufficient overlap in difficulties and their etiology to support "lumping" individual

diagnoses into groups rather than "splitting" (Watson et al., 2005). The language we use in this

paper to describe psychopathology reflects the papers being reported; wherever possible we

use diagnostic terms (such as conduct disorder) but some authors refer to internalizing

(emotional) disorders and externalizing / disruptive disorders (conduct disorders and ADHD).

A comprehensive review of the literature on the persistence of all childhood disorders is beyond

the scope of this paper, but interested readers may wish to access Costello and Maughan's

(2015) excellent review of the outcomes of childhood mental illness. Epidemiological studies of

conduct disorder suggest persistence rates ranging from 48-56% over durations of three or more

years (Silberg et al., 2015; Stringaris & Goodman, 2009), which may be related to initial severity,

early substance use, early age of onset, co-morbid Attention Deficit Hyperactivity Disorder

(ADHD), callous/unemotional traits and family history of antisocial behaviour (Byrd et al. 2012;

Moffitt et al., 2008; Costello & Maughan 2015). Complex interactions between these factors are

likely, which may in turn also influence persistence (Moffitt et al. 2008). Retrospective and

prospective studies suggest that persistence of conduct disorder is associated with educational

and interpersonal impairment (Biederman et al. 2010), paternal anxiety or mood disorder,

parental antisocial personality disorder (Lara et al. 2009) and childhood maltreatment (Kessler

et al. 2005).

The persistence of ADHD has mostly been studied from childhood to adulthood, with the reported prevalence for persistent disorder ranging from 15-50% among 25-41 year olds, with higher estimates still for those who experience subclinical but impairing levels of symptoms (Costello & Maughan, 2015). Prevalence ratios among 13-17 year olds in the National Comorbidity Replication Adolescent supplement were 69% 30 day to 12 months and 75% 12 months to life-time diagnoses (Kessler et al. 2012). A recent cohort study suggested that inattentive difficulties were relatively stable over six years among children aged 5-13 at baseline, while hyperactivity and impulsivity reduced with age (Holbrook et al, 2016). Persistent ADHD in childhood seems to be related to severity (Steinhausen et al. 2003) as well as comorbidity with aggression, disruptive behavior, mood and anxiety disorders (Hurtig et al. 2007; Langley at al. 2010). Child or paternal inattention, family history of ADHD and psychosocial adversity are also related to persistence (Silberg et al. 2015; Hurtig et al. 2007).

The literature on the persistence of anxiety disorders is sparse, and often focused on particular types of anxiety, for example, does separation anxiety predict panic disorder (Costello et al. 2005). In the Oregon Depression Project, 28% of those with an anxiety disorder at baseline were estimated to fulfil DSM III-R criteria for an anxiety disorder 12 months later (Orvaschel et al. 1995). The National Comorbidity Replication among adolescents reported the ratio of 12 month to lifetime prevalence for any anxiety to be 80% and the 30 day to 12 month ratio to be 60% among 13-17 year olds (Kessler et al, 2012). These studies of anxiety disorders suggest high levels of persistence and also fluctuation in the level of difficulties (Costello et al. 2005; Essau et al. 2002). Older children and those experiencing adverse life events appear to be most at risk of persistent anxiety (Essau et al. 2002). Similarly, many factors have been linked to persistent or recurrent depression, including lower socio-economic status, family discord, a family psychiatric

history, adverse life events, non-Caucasian ethnicity, older age, and comorbid anxiety or substance abuse (Birmaher et al. 2002; Zalsman et al. 2006). <mark>Depressive disorder was present at baseline and 12 months later in 52% in the Oregon Depression Project (Orvaschel et al, 1995), while the National Comorbidity Adolescent survey reported the 30 day to 12 months prevalence ratio for depressive disorder to be 32% while the equivalent for 12 month to life-time depression was 70% (Kessler et al. 2012).</mark>

In summary, findings are contradictory and often based on clinical samples that are frequently small and may be skewed towards persistence by severity, which predicts service contact (Ford et al. 2008). The current study aimed to investigate the prevalence and predictors of persistence of the same disorder among a population-based sample of school-aged children with four broad categories of psychiatric disorder (anxiety, depression, conduct disorder and ADHD) separately and combined over three years. The latter addressed the question of how many children in the community can be expected to experience clinical levels of impairment after a period of three years regardless of access to services, which is of importance for service development and commissioning. Analysis of the broad types of disorder addressed factors that impede recovery from these specific types of difficulties and are therefore important considerations for practitioners. We hypothesized that we would detect distinct predictors of the persistence for each major group of disorder, but that severity would predict the persistence of all types of disorders and that disruptive behavior and ADHD would demonstrate greater levels of persistence than anxiety and depression. <mark>Given the lack of previous studies in epidemiological datasets, this was an exploratory analysis and we did not specify other predictors a priori, but we tested as many variables highlighted by previous literature as possible (comorbidity, severity,</mark>

METHOD

Ethical approval for analysis of this dataset was initially granted by the Joint Research Ethics Committee of the Institute of Psychiatry and South London and Maudsley NHS Foundation Trust.

Participants

The 1999 and 2004 British Child and Adolescent Mental Health Surveys assessed the mental health of two separate samples of school-age children conducted by the same team, using the same methods (Ford et al. 2003; Green et al. 2005). The child benefit register was used to develop a sampling frame of postal sectors from Great Britain. Child benefit was a universal state benefit payable for each child in the family with an extremely high uptake. Approximately 10% (901/9000) of postal sectors were sampled with a probability related to size of sector, and stratified by regional health authority and socio-economic group, representing approximately 90% of all British Children (Stringaris & Goodman, 2009). The combined initial sample included 26,544 children aged 5-16 years of whom 23,025 (87%) were approached as 7% opted out before their details were passed to the researchers, while 6% were ineligible or had moved without trace. Of the eligible children (23,025) 18,415 (80%) took part. Researchers were unable to contact 3% of the eligible families and 17% of families refused to participate.

Families were followed up three years after each initial survey, in 2002 and 2007 respectively. All those with one or more psychiatric disorders according to the baseline survey were invited to follow up (n=1667) of whom 998 (60%) participated at follow up (Stringaris & Goodman, 2009).

Insert figure 1 here

Measures

Psychiatric disorder was assessed using the Development and Well-Being Assessment (DAWBA) (Goodman et al. 2000), which combines highly structured questions that relate directly to diagnostic criteria with qualitative descriptions of any problem areas in the informants own words with prompts to elicit clinically relevant details. The time frame of the questions relates to the diagnostic criteria, for example two weeks for depressive disorder, six months for conduct disorder and so the measure generates a point prevalence. Parents and young people aged over 11 were interviewed by a team of trained lay interviewers, while an abbreviated version was mailed to the child's teacher with the family's permission. A small team of experienced child psychiatrists combined structured and qualitative information at symptom level presented simultaneously for each disorder from all informants to assign diagnoses according to DSM-IV criteria (see www.dawba.info; American Psychiatric Association, 1994). The kappa statistic for chance-corrected agreement between two clinical raters who independently rated 500 children in the 1999 survey was 0.86 for any disorder (standard error SE 0.04), 0.57 for internalising disorders (SE 0.11), and 0.98 for externalising disorders (SE 0.02). The test-retest reliability of the DAWBA was not assessed since, as discussed in more detail elsewhere (Goodman et al. 2000), re-administration after a short interval would have been difficult to interpret due to the effects of 'attenuation' and 'respondent fatigue', while re-administration after a longer interval would have confounded test-retest unreliability with genuine remission or deterioration. Independent DAWBA reassessments of children attending mental health clinics have generated substantial agreement between the clinic diagnosis and the DAWBA diagnosis (Goodman et al. 2000). There

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were striking differences between rates of diagnosis in clinic and community samples, and within community samples, subjects with and without diagnosed disorders differ markedly in external characteristics and prognosis (Goodman et al. 2000: Goodman et al. 2002).

Parents also completed the Strengths and Difficulties Questionnaire (SDQ) at both time points to provide a dimensional measure of child psychopathology. In this widely used and validated scale (Goodman, 2001), 25 items are divided between five scales, generating scores for conduct problems, hyperactivity-inattention, emotional symptoms, peer relationships and prosocial behaviors; all but the last are summed to generate a total difficulties score. Items are phrased as either a positive or negative statement and informants select between the following responses; "not true", "somewhat true" or "certainly true", scored 0, 1, 2 or reversed with positive statements, so that a high score indicates difficulty, with the exception of the prosocial scale in which higher scores indicate less difficulty. The SDQ impact supplement generates an impact score based on ratings of child distress and the impact of difficulties on home life, friendship, classroom learning, and leisure activities. An additional question asks about the burden of the psychopathology to the informant (rated 'not at all', 'only a little' 'quite a lot', 'a great deal'). The SDQ burden rating has been shown to correlate well with the more detailed Child and Adolescent Impact Assessment (Goodman, 1999).

Demographic details collected during the parents' interview included the child's general health rated on a five-point scale coded here as good (very good and good) or bad (average, bad and very bad), and whether the child suffered from a list of medical conditions. From responses to the latter, children were classified as having a "neurodevelopmental disorder" if parents reported cerebral palsy, epilepsy, muscle disease or weakness, or co-ordination problems. The

General Health Questionnaire assessed parental symptoms of anxiety and depression (Goldberg et al. 1997), while the McMaster Family Assessment Device measured family functioning (Miller et al. 1985). Parents were asked whether ten stressful life events (parental separation, major financial crisis, parental criminal court appearance, parental mental or physical health problem, death of a sibling or friend, hospital admission, involvement in a serious accident, ending of a key friendship) had happened during their child's' lifetime (Goodyer et al. 1990). Parents were also asked if their child had an intellectual disability and/or dyslexia.

Statistical Analysis

The majority of analyses used SPSS version 23.0; those that required adjustment for survey design used STATA 11. Previous analyses on these and other data have shown that adjustment for weighting, stratification and clustering is necessary for point prevalence but not for associations (Fombonne et al. 2001; Wolke et al. 2009). Therefore, prevalence estimates were generated with weights that adjusted for the complex survey design and loss to follow up, while the remaining analyses were unweighted.

We assessed the influence of loss to follow up among those with disorder at baseline on all variables included in the analysis. We then conducted one analysis that combined all disorders as this provides a measure of both homotypic and heterotypic persistence at the level of meeting one or more psychiatric diagnoses, while separate analyses considered each of the following four broad diagnostic groupings: ADHD; conduct disorder, anxiety, and depression. These groups were chosen because these difficulties are the most common seen at child and adolescent mental health services in this age group (Ford et al, 2007). For the broad diagnostic

groupings, disorders were classified as "persistent" if the child was categorized as having a

DSM-IV disorder within the same broad diagnostic group at both baseline (Time 1) and follow up

(Time 2). Despite the very large initial sample size, the prevalence of conditions (autism

spectrum, tics) and some individual disorders, such as separation anxiety, was too low to allow

analysis. Comorbidity was defined as having disorders from more than one of the four broad

diagnostic groupings.

In order to have comparable multivariable logistic regressions, multivariable analysis included

subjects with complete data for all variables that predicted persistence at the univariable stage

(n=980; 18 excluded). Baseline exposures / confounders listed below were dichotomized into

the two categories; where possible Category 1 represents children expected to be at higher risk

of persistent disorder and Category 2 children at lower risk. For some variables, such as age and

gender, the aetiological literature suggested a different relationship with different disorders, so

we used the nonspecific labels Category 1 and Category 2 in the tables and text. This analysis

was exploratory, given the lack of similar community based studies, so each variable tested was

a potential confounder as well as a potential exposure.

For each of the following outcomes we conducted a univariable analysis and a two stage

multivariable analysis using logistic regression: "any diagnosis", ADHD, conduct disorder,

anxiety, and depression at baseline. Baseline exposures / confounders with significant odds

ratios (p<0.05) in univariable logistic regression were incorporated into multivariable analysis.

Due to the interrelated nature of many of the background variables, baseline exposures /

confounders were divided into four groups (domains): child factors (age, gender, physical health,

neurodevelopmental disorder, intellectual disability, peer relationships and prosocial behavior);

family factors (type and size, ethnicity, parental mental health, housing tenure, employment

status income, life events, parental educational level); and psychopathology split into severity (comorbidity, and parent SDQ total difficulties, impact, and burden scores) and type (broad diagnostic group). The first stage of the multivariable analysis (within domain) incorporated all the variables within one of these domains entered as a block, followed by conditional stepwise regression removing one variable at a time to determine those that independently predicted persistence (p<0.05). The independent predictors from the analysis of each domain were then entered as a block into the second and final cross-domain multivariable logistic regression as a block again followed by conditional stepwise regression to establish the independent predictors (p<0.05) across the child, family and psychopathology domains (cross domain) for each outcome separately (any disorder, ADHD, conduct disorder, anxiety and depression).

RESULTS

Children in the sample analyzed were aged between five and 16 years at baseline (mean age 10.6, standard deviation 3.2) and 62% were boys with 7% from Black or Minority Ethnic backgrounds. Approximately half (51%) were living with both biological parents, while a third resided with a single parent and 15% with reconstituted or complex families. Those lost to follow up did not differ from those who participated in terms the type of disorder at baseline; ADHD 22.7% vs. 24.2%, Depression 9.3% vs. 9.2%, Anxiety 38.7% vs. 37.5%, conduct disorder 51.5% vs. 55.8%, comorbidity 24.8% vs. 25.0%). Participants and non-respondents also did not differ in terms of gender, family size and function, parental mental health, life events, and child general health, neurodevelopmental disorder or intellectual disability. They also had similar parental SDQ prosocial, peer relationships, total difficulties, impact and burden scores. Participants were, however, younger (mean age 10.6 vs. 11.1 years, t=5.7, p=0.001), less likely to be from an ethnic minority (8% vs 13%, χ^2=14.7, p=0.005) or to live in rented housing (23.9% vs.

38.8%, χ^2= 31.3, p=0.001), while more likely to live with both biological parents (51.2% vs. 41.2%, χ^2=11.4, p=0.001) who were more likely to be educated to a higher level (30.4% no qualifications vs. 37.7%, χ^2=19.4, p=0.001) with at least one parent working (72.2% vs. 59.6%, χ^2=19.4 p=0.001) and a family income that exceeded £199 per week (27.8% vs. 37.1%, χ^2=15.4, p=0.001).

Insert Table 1

The weighted prevalence of psychiatric disorders was approximately 10% at baseline and at follow up (Table 1), while the weighted persistence of each disorder from time 1 to time 2 was approximately 50% overall. One third (36%) of the children with persistent disorders were reported to have the same broad diagnoses at follow up.

Insert Table 2

Table 2 presents the univariable analysis of predictors of the persistence of **any** psychiatric disorder at follow up for each domain of analysis and Table 3 presents the subsequent within and cross-domain analyses for this outcome. Table 2 shows the actual number of children in each bivariate category of each exposure/confounder at baseline (labelled category 1 and category 2), and the number and proportion with persistence of any psychiatric disorder at follow up. For example, the first row reports that 483 individuals who had a psychiatric disorder initially were in the 5-10 year age band (labelled category 1), and of these, 239 (49%) still had a psychiatric disorder at follow up. Grouping all disorders together, child factors that predicted persistence were male gender, and the presence of a neurodevelopmental disorder or

intellectual disability. Family factors were large family size, higher parental anxiety-depression scores, living in rented housing and life events. Greater persistence was predicted by all measures of severity, while baseline diagnoses of externalizing disorders were more likely to persist than anxiety disorders.

Insert Table 3 around here

Table 3 illustrates the factors that predict the persistence of all psychiatric disorders combined in multivariable analyses. Independent predictors of persistence were intellectual disability, severity and ADHD at baseline, with a marginal relationship with socio-economic deprivation as defined by living in rented housing. The equivalent analyses were carried out for each of the four broad diagnostic groupings (see Supplementary Tables 1-8), and the results of the final cross-domain multivariable analyses (equivalent to the far right-hand column of Table 3 for all disorders combined) are shown in Table 4 for each broad diagnostic grouping. Persistent conduct disorder was predicted by intellectual disability, rented housing, large family size, poor family functioning and by increased total difficulties scores at baseline. Persistent ADHD was predicted by higher scores on the peer problems SDQ subscale, as were persistent anxiety disorders. Persistent depression was not predicted by any factors in the final cross-domain analysis, which was likely due to the very small numbers of individuals in this category.

Insert Table 4 around here.

DISCUSSION

We discuss our findings from the cross domain analyses and their implications firstly in relation to our initial predictions and then by disorder, before reflecting on the strengths and limitations of our study. Approximately half of those with impairing psychiatric disorder met diagnostic criteria three years later, which replicates the findings of other epidemiological studies (Copeland et al. 2013; Kessler et al. 2012; Costello et al. 2003; Rutter et al. 1976). Conduct disorder and ADHD were more likely to persist than emotional disorders; findings that echo our expectations and some previous reports (Copeland et al. 2013; Rutter et al. 1976). The National Comorbidity Survey (Kessler et al. 2012) reported that anxiety disorders as well as behavior disorders were highly persistent, but compared 30 day, 12 month and life time persistence in a cross sectional survey as opposed to prospectively collected follow up data.

Initial severity, in terms of parental reported burden and high symptom score, predicted the persistence of meeting at least one psychiatric diagnosis; high symptoms score predicted persistent conduct disorder. Contrary to our expectations, severity did not predict the persistence of ADHD, anxiety or depression, which may relate to statistical power, as previous work has suggested that severity is an important influence on the persistence of all types of psychopathology (Costello & Maughan, 2015). As the influence of attenuation and regression to the mean would tend to reduce psychopathology scores over time (Porta et al. 2008), milder cases only require a small improvement to move below a diagnostic threshold, whereas a similar absolute improvement in a more impaired individual would still leave them above this cut point. Alternatively, the association between severity and persistence may arise via socio-demographic factors that both impair and perpetuate. Finally, we detected different predictors for each of the broad diagnostic groupings as expected.

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Persistence was predicted by parent reported burden related to psychopathology but not its impact on the child, which was surprising because in multivariable analyses, measures with a larger number of items typically drive out equivalent measures based on fewer questions due to reduced measurement error. As in our analysis, burden (based on one question) was a stronger predictor than impact (five items), we suspect that the burden question may measure more than severity alone. A parental report that the child's difficulties are burdensome to manage would seem to indicate a parent-child relationship under pressure. Parents who are willing to describe their child as a burden may also be more critical and hostile towards them; such negative expressed emotion has been associated with psychopathology (Datta et al. 2002).

ADHD in our sample was more likely to be persistent among children with poor peer relationships, but was not related to psychiatric comorbidity as findings from some but not all studies have suggested (Steinhausen et al. 2003; Langley et al. 2010; Costello & Maughan, 2015). The persistence of conduct disorders in the present study was predicted by increased severity and lower socio-economic status, replicating previous work (Moffitt et al. 2008; Loeber et al. 2000), as well as parental reported intellectual disability. Cognitive limitations may perhaps make it harder to learn alternative behaviours.

The persistence of anxiety was also predicted by poor peer relationships, and unlike Essau (2002), we did not find persistent anxiety was predicted by older age or life events, which may reflect methodological differences. Our study examined a broader age range but fewer life events.

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Peer relationships predicted the persistence of anxiety and ADHD and had a marginal association after adjusting for other child factors with persistent conduct disorder (1.46, 0.98-2.17), which has also been reported by others (Costello and Maughan, 2015; Loeber et al., 2000). Our findings would suggest that the development and implementation of interventions to promote good peer relationships might be important to promote and maintain children's recovery from these disorders.

Our findings indicate the importance of separating factors that influence onset of disorders from those that influence its persistence, which may or may not be the same. The increased prevalence of childhood psychiatric disorder detected among some vulnerable populations (those living in deprived circumstances, with poor physical health or special educational needs for example) may well be due to higher levels of persistence in addition to increased susceptibility to their onset, with the obvious implication for service commissioning and provision. While age and gender are related to the prevalence of different types of psychiatric disorder, they did not predict its persistence as reported by others (Kessler et al. 2012). For example, in the current sample as the epidemiological literature would predict, ADHD and conduct disorder were more common among boys, whilst depression was less common among younger children (Ford et al., 2003; Green et al. 2005). As with other characteristics, age and gender may either be important to the onset of disorder but do not seem to influence recovery or persistence; or any influence may operate at the level of individual diagnoses that our analysis of broad groups may have masked.

Our findings emphasize the need for clinicians to take a broad view of intervention with the children they see and their families; factors other than the child's diagnosis may impede or

indeed promote and/or maintain recovery, and thus present important therapeutic targets. For example, ensuring that a child's difficulties in school related to intellectual disability are being optimally managed may impact on the child's recovery. If parental reports of burden are demonstrated to indicate problematic parent-child relationships, interventions that address negative expressed emotion and increase positive parenting may aid and maintain recovery. These are also areas in which future research should focus to explore the predictive factors that we have identified in relation to response to interventions in clinical samples. Children with the characteristics that predict the persistence of their difficulties may need increased intensity and/or alternative approaches.

The strengths of this study lie in access to a large population-based sample that applied standardized multi-informant assessment of psychiatric disorder. The prevalence of disorder was at the lower end of the reported range (Costello et al. 2005), which may reflect the relatively high threshold of the diagnostic measure used (Angold et al. 2012). The selective loss of children with psychiatric disorder in the follow up studies to both surveys reduced the sample available for the current study. Loss to follow up will have reduced the power available to the analysis and participants in the follow-ups were a marginally younger, more socio-economically advantaged group. While empirical data from the Avon Longitudinal Study of Parents and Children (Wolke et al. 2009) demonstrates that selective attrition does not necessarily bias findings as previously feared, we cannot be sure whether that applies to the present sample, though the loss of those potentially at most risk would generally diminish rather than augment the chance of detecting an association. In this context, it is reassuring that there was no selective loss of children with key outcome data such as the severity and type of psychopathology and that there were no significant differences between participants and those

lost to follow up on 19 of the 26 variables tested. The analysis of data gathered for other reasons is always constrained by the variables originally collected, and there was an absence of key resilience measures that should be explored in future studies.

While some diagnostic categories remain contentious in child mental health (Angold and Costello, 2009), such as bipolar disorder or depression in very young children, the current analysis focused on less contentious common presentations among school aged children.

We were able to study specific diagnostic groups rather than grouping all disorders together as many other investigators have had to with population samples, but we lacked power to study individual diagnoses. There were no independent predictors for depression, and only peer relationships predicted ADHD and anxiety (Table 1), which suggests that despite such a large initial sample, our analysis may have lacked power. The failure to detect statistically significant independent predictors of depression is in contrast to the large range of factors that predicted recurrent and persistent depression in previous work, albeit primarily with clinical cohorts. This may partly reflect limited statistical power as our study had only 93 subjects with depression, and / or less severe symptomatology often found in community as opposed to clinical samples. There were some potential predictors with marginal associations in the within domain and final cross domain analyses that might still warrant further study in clinical samples. For example, peer relationships and burden for conduct disorder, and neurodevelopmental disorder for ADHD. The least common disorder studied (depression) had no independent predictors, although our analyses suggest that parental psychopathology, socio-economic deprivation, initial severity and comorbidity may be worth further study in larger samples. While it was

interesting that all the young people with depression at baseline who participated in the follow up had neurodevelopmental disorder and poor family function, this meant that these variables could not be studied further and could have occurred by chance. Similarly, it is intuitively plausible that parental common mental disorder may predict the persistence of affective difficulties among their offspring and we await the results of some promising programs that address anxiety children through work with their parents (Creswell & Hartwright-Hatton, 2007)

Given the sparse literature and the breadth of the focus of this study, we used a stepwise analytic approach rather than one identified based on a priori knowledge. This approach risks the capitalization of findings by chance which may not be reproducible in another data set but was deemed most appropriate to the exploratory nature of this analysis. Future studies can use these findings as a foundation on which to take a more theoretical approach.

We use the term persistence to indicate children who met diagnostic criteria at two surveys, three years apart. We have no knowledge of the trajectory of their psychopathology between the baseline and follow-up surveys. Ideally, we would have assessed diagnoses and risk factors at least annually, and documented all services received over the course of follow up; we were prevented from doing so by resource constraints. Given space limitations, this paper has focused on homotypic continuity rather than heterotypic continuity, which should also be examined in future studies.

Conclusion

Approximately 50% of children with disorders at baseline met criteria for at least one psychiatric disorder three years later while externalizing disorders were more likely to persist than

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emotional disorders. Different characteristics predicted the persistence of different types of disorders, and predictors included some potentially tractable difficulties such as poor peer relationships and family functioning. The predictors elicited may be useful indicators of children who require additional and/or innovative intervention if replicated and tested in clinical samples. The prevalence of childhood psychiatric disorder among vulnerable groups of children might be increased because of the persistence of disorders as well as increased incidence.

Declarations of interest

Robert Goodman is owner of Youthinmind Limited, which provides no-cost and low-cost websites related to the DAWBA and SDQ

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Authors' contribution

Tamsin Ford: was a clinical rater on the surveys, suggested the current analysis, which she supervised and contributed substantially to drafting and revising the manuscript.

Fiona MacDiarmid: led the analysis and initial literature reviews, wrote the first draft of the manuscript and commented on later drafts

Abigail Russell: conducted additional analyses and led the final revision of the manuscript.

Daniel Racey: updated the literature review, contributed to analysis, and was involved subsequent drafting and revisions of the manuscript.

Robert Goodman: was the one of the principle investigators on all four surveys, and contributed substantially to the analytic plan and drafting and revising the manuscript.

Table 1. The prevalence of psychiatric disorder at baseline (Time 1) and three year follow up (Time 2) and the proportion with persistent disorder of the same general type among school age children participating in the British Child and Adolescent Mental Health Surveys

DSM-IV Disorder	Weighted point prevalence (%) at Time 1, aged 5-16, N=18415 (95% CI)	Weighted point prevalence (%) at Time 2, aged 8-19, N=7912	Weighted persistence (%) for that disorder from Time 1 to Time 2
Any disorder	9.4 (9.0 to 9.8)	10.3 (9.6 to 11.0)	49.3 (45.7 to 52.9)
Any anxiety	3.5 (3.2 to 3.8)	3.9 (3.5 to 4.3)	25.5 (20.2 to 30.8)
Any depression	0.9 (0.8 to 1.0)	1.5 (1.2 to 1.8)	18.8 (9.6 to 28.0)
Any ADHD	2.2 (2.0 to 2.4)	1.6 (1.3 to 1.9)	43.7 (36.7 to 50.7)
Any conduct disorder	5.0 (4.7 to 5.3)	5.3 (4.8 to 5.8)	43.5 (38.6 to 48.4)

Table 2. Univariable analyses of baseline child and family factors, and the severity and type of psychopathology on the persistence of any psychiatric disorder at 3 year follow up

Independent variable at Time 1 (Category 1 v Category 2) Where possible, Category 1 refers to children expected to be at higher risk and listed first in parenthesis below. For example, Category 1 for age refers to children aged 5-10 years, and Category 2 to those aged 11-15.	Proportion with persistent disorder at 3-year follow-up		Unadjusted Odds Ratio (95% Confidence interval)	Proportion of missing cases at T1 (%)
	Category 1 % (n/N)	Category 2 % (n/N)		
Child factors				
Age (5-10 years v. 11-16 years)	49 (239/483)	44 (228/515)	1.23 (0.96-1.58)	0
Gender (male v. female)	51 (313/616)	40 (154/382)	1.53 (1.18-1.98)	0
Neurodevelopmental disorder (present v. absent)	70 (85/122)	44 (382/876)	2.97 (1.98-4.47)	0
Physical health (poor v. good)	53 (93/175)	46 (374/822)	1.36 (0.98-1.88)	0.1
Intellectual disability (present v. absent)	66 (192/293)	39 (275/705)	2.97 (2.24-3.95)	0
SDQ[1] prosocial score (<6 v. 6+)	67 122/183	42 341/809	2.75 (1.96-3.85)	0.6
SDQ peer relationships score (3+ v. <3)	57 312/549	34 151/443	2.55 (1.94-3.30)	0.6
Family factors				
Ethnicity (non-white v. white)	48 (32/66)	47 (435/932)	1.08 (0.65-1.77)	0
Family size (4+ children v.1-3)	56 (85/153)	45 (382/845)	1.52 (1.07-2.14)	0
Family function score[2] (3 + v.1<3)	71 (10/14)	46 (445/967)	2.93 (0.91-9.42)	1.7
Parental anxiety/depression score[3] (3+ v.< 3)	51 (223/437)	43 (234/549)	1.40 (1.09-1.81)	1.2
Housing tenure (rented v. owner occupied)	52 (232/450)	43 (235/548)	1.42 (1.10-1.82)	0
Family type (other v. two biological parents)	49 (238/483)	44 (225/511)	1.24 (0.96-1.59)	0.4
Household employment (no parent working v. 1+ working)	51 (141/276)	45 (323/718)	1.28 (0.97-1.69)	0.4
Family income (< £199 v. £200+)	46 (305/668)	45 (115/257)	1.04 (0.78-1.39)	7.3
Presence of life events (3+ life events v. < 3 life events)	52 (153/293)	44 (310/700)	1.38 (1.05-1.81)	0.5
Mothers level of education	48	46	1.06	0.8

(no qualifications v. qualifications)	(145/306)	(315/684)	(0.81-1.38)	
Severity of psychopathology				
Comorbidity (present v absent)	64 (175/272)	40 (292/726)	2.68 (2.01-3.58)	0
Burden on the SDQ (moderate & severe v. nil & mild)	61 (305/501)	32 (158/491)	3.28 (2.53-4.26)	0.6
SDQ total difficulties score (17+ v.<17)	65 (312/480)	29 (151/512)	4.44 (3.40-5.80)	0.6
SDQ impact score (2+ v <2)	59 (315/531)	32 (148/461)	3.08 (2.38-4.01)	0.6
Type of psychopathology				
Anxiety disorder (present v. absent)	39 (151/386)	52 (316/612)	0.60 (0.47-0.78)	0
ADHD (present v. absent)	66 (149/227)	40 (192/484)	1.75 (1.36-2.25)	0
Depressive disorder (present v. absent)	40 (37/93)	48 (430/905)	0.73 (0.47-1.13)	0
Behavioral Disorder (present v. absent)	54 (275/514)	40 (192/484)	1.75 (1.36-2.25)	0

SDQ= Strengths and Difficulties Questionnaire. 2. Family function score on McMaster's
Family Assessment Device. 3. Psychopathology on the General Health Questionnaire

Table 3. Persistence of psychiatric disorder (any type) at 3 year follow-up: multivariable analyses of within and across predictor domains

Independent Variable at baseline (Category 1 v. Category 2) Where possible, Category 1 refers to children expected to be at higher risk. And is listed first in parenthesis below. For example, Category 1 for age refers to children aged 5-10 years, and Category 2 to those aged 11-15.	Unadjusted Odds ratio	Within Domain[1] Adjusted Odds ratios (95% CI)	Cross Domain[2] Adjusted Odds ratios (95% CI)[3]
Child factors			
Gender (male v. female)	**1.53 (1.18-1.98)**	1.30 (0.98-1.70)	*
Neurodevelopmental disorder (present v. absent)	**2.97 (1.98-4.47)**	**1.61 (1.03-2.53)**	1.57 (0.97-2.54)
Intellectual disability (present v. absent)	**2.97 (2.24-3.95)**	**2.04 (1.49-2.80)**	**1.56 (1.11-2.18)**
SDQ[4] prosocial score (<6 v. 6+)	**2.75 (1.96-3.85)**	**2.04 (1.42-2.91)**	1.40 (0.95-2.07)
SDQ peer relationships score (3+ v. <3)	**2.55 (1.94-3.30)**	**1.80 (1.36-2.37)**	1.17 (0.85-1.61)
Family factors			
Family size (4+ children v . 1-3)	**1.52 (1.07-2.14)**	1.07 (0.95-1.21)	*
Parental anxiety/depression score[5] (3+ v.< 3)	**1.40 (1.09-1.81)**	**1.32 (1.02-1.71)**	1.12 (0.84-1.61)
Housing tenure (rented v. owner occupied)	**1.42 (1.10-1.82)**	**1.31 (1.01-1.70)**	1.25 (0.94-1.68)
Presence of life events (3+ v. <3)	**1.38 (1.05-1.81)**	1.25 (0.94-1.65)	*
Severity of psychopathology			
Comorbidity (present v. absent)	**2.68 (2.01-3.58)**	**1.49 (1.08-2.07)**	1.11 (0.77-1.64)
Burden on the SDQ (moderate & severe v. nil & mild)	**3.28 (2.53-4.26)**	**1.74 (1.25-2.42)**	**1.84 (1.35-2.51)**
SDQ total difficulties score (17 + v.<17)	**4.44 (3.40-5.80)**	**2.90 (2.14-3.93)**	**2.13 (1.52-3.01)**
SDQ impact score (2 + v.<2)	**3.08 (2.38-4.01)**	0.76 (0.54-1.07)	*
Type of psychopathology			
Anxiety disorder (present v. absent)	0.60 (0.47-0.78)	1.01 (0.73-1.39)	*

Conduct disorder (present v. absent)	**1.75** **(1.36-2.25)**	**1.68** **(1.25-2.27)**	1.11 (0.81-1.51)
Attention Deficit Hyperkinetic Disorder (present v. absent)	**2.72** **(2.00-3.71)**	**2.64** **(1.90-3.67)**	**1.68** **(1.15-2.45)**

1. Within domain analysis included separate analysis of child factors, family factors, severity of psychopathology and type of psychopathology. 2. Cross domain analysis included the significant predictors from each within domain analysis. 3. CI = confidence interval 4 Strengths and Difficulties Questionnaire 5. Psychopathology according to the General Health Questionnaire * not significant in the within domain analysis so subsequently excluded

Table 4. Independent predictors of homotypic persistence for each of the four broad diagnostic groupings at 3 year follow up: final adjusted multivariable results for all four predictor domains

Independent variable at baseline Where possible, Category 1 refers to children expected to be at higher risk. And is listed first in parenthesis below. For example, Category 1 those with neurodevelopmental disorder, and Category 2 to those without.	ADHD Adjusted Odds Ratio (95% CI)[1]	Conduct Disorders Adjusted Odds Ratio (95% CI)	Anxiety Disorders Adjusted Odds Ratio (95% CI)	Depression Adjusted Odds Ratio (95% CI)
Intellectual disability (present v. absent)		1.67 (1.08-2.57)		
SDQ[2] peer relationships score (3+ v. <3)	2.32 (1.28-4.18)		1.88 (1.15-3.06)	
Housing Tenure (rented v. owner occupied)		1.70 (1.15-2.52)		
Family size[4] (4 or more children v. 1-3)		1.79 (1.08-2.95)		
Family function score[5] (3+ v. < 3)		5.49 (1.09-27.69)		
SDQ total difficulties score (17+ v. <17)		2.92 (1.85-4.61)		

1. 95% confidence interval 2. SDQ= Strengths and Difficulties Questionnaire
3. Family function score on McMaster's Family Assessment Device. 4.
Psychopathology on the General Health Questionnaire 5. Family function score on McMaster's Family Assessment Device