School characteristics and children's mental health: A linked survey-administrative data study

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Contributors statement: PP, EN and EF planned the study, PP and EN analysed the data, JD and PP were part of the group that collected the data and all authors contributed to drafting the manuscript for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. PP acts as guarantor for the paper.

Acknowledgements

The authors thank the Department for Children, Schools and Families (now Department for Education), England, for funding the research. The funders had no involvement in this research or in the decision to submit the manuscript for publication. They are grateful to the members and advisors of the research group involved in the wider project, and the staff and students of participating schools for their contributions to this research.

Conflicts of interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Abstract

Background. Mental health difficulties are childhood-onset with lifelong consequences.

Children spend a large proportion of their daily life in schools, making the school setting an important context for mental health prevention and support.

Methods. Data from a large-scale mental health survey were linked to the national pupil and school census databases. Data from 23,215 children from 648 primary schools were analysed to examine the associations of school composition (school size, gender, socioeconomic and ethnicity composition) and school climate with emotional and behavioural symptoms, as well as high mental health difficulties (scores above clinical cut-off). The proportion of school-level variation explained by composition and climate and whether the association of school factors with mental health were moderated by child-level socio-demographic characteristics were also investigated.

Results. After controlling for child-level characteristics, 3 to 4.5% of the variation in children's mental health outcomes could be attributed to schools. Of this, small proportions were explained by school composition (1.4 to 3.8%) and larger proportions were explained by differences in school climate (29.5 to 48.8%). In terms of composition, lower school socio-economic status (SES) was associated with higher mean behavioural symptoms and slightly raised odds of high mental health difficulties (OR = 1.05, 95% CI: 1.01, 1.09). More positive school climate was associated with lower mean emotional and behavioural symptoms and lower odds of mental health difficulties (OR = 0.78, 95% CI: 0.74, 0.81). Some of the associations between school factors and mental health were moderated by child sex and SES.

Conclusion. School composition was for the most part not associated with children's mental health and explained only a small proportion of the between school variation in mental health. School deprivation was the only compositional variable to be associated with poor

mental health and its association was moderated by the child's socio-economic status. School climate explained a large amount of the between-school variation in mental health and appears a good target for universal prevention of mental health difficulties in children.

Keywords: mental health, community, prevention, young people, school, education

Introduction

Recent prevalence estimates indicate that 1 in 8 children has a diagnosable mental health disorder,¹ with many more having high levels of mental health difficulties.² For many, mental health difficulties are first experienced in childhood,³ and have long-term negative consequences on a range of social and health outcomes later in life.⁴ Common mental health disorders such as depression and anxiety are a leading cause of disease burden worldwide.⁵ Analysis of time trends suggest that levels of mental health difficulties, especially emotional difficulties, are increasing in recent generations^{6,7} and there is some evidence that mental health difficulties are manifesting earlier in primary school-aged children when compared to previous generations.⁸ This highlights the large public health challenge of child mental ill-health with increased focus by governments nationally and internationally on increasing understanding to inform prevention efforts specifically in young people.^{9,10}

Schools, given their near universal access to children, and the large proportion of time children spend there, have been highlighted by national and international efforts as a key context in which early mental health intervention, screening and prevention efforts might be fruitfully concentrated.^{9,10} However, compared to the vast body of research evidence regarding the contribution of the family context on children's mental health, there is comparatively little research investigating the role of school context on children's mental health. This is a critical omission to the population health literature as both the characteristics of the school itself and socialising within this complex environment is likely to influence the development of mental health problems.¹¹ Even less is known about whether school-level characteristics provide differing levels of risk to different children based on children's socio-demographic characteristics and needs, that is, the interplay between school-level and individual-level characteristic in understanding child mental health. Previous research has shown that up to 5% of variability in mental health difficulties is accounted for by

schools,^{12,13} which is non-negligible and comparable to the proportion of variation in childhood mental health explained by family socio-economic position.¹⁴

In those few studies that have examined the role of schools in the development of mental health problems, socio-demographic composition such as school size, gender balance and deprivation have been the main focus,^{13,15,16} with inconsistent findings concerning the role of these compositional features for child mental health. For example, some research has concluded that school composition is not strongly associated with mental health,^{13,16} while others have found that they do indeed explain a substantial proportion of the school-level variation in mental health.¹⁵ It is important to highlight that, regardless of the influence of these compositional factors for child mental health, they are non-malleable, instead identification of those schools that may be more likely to have students with poor mental health may inform the allocation of additional support. There are, however, malleable school-level factors, such as school climate,¹⁷ that are potential targets for universal intervention that may in turn influence child mental health. Improving school climate has been suggested as an avenue to promote learning, healthy peer relationships, school connectedness and reduction in school dropouts.¹⁸⁻²⁰ Research also suggests that children feeling connected to their schools and liking schools is a protective factor in the development of mental health difficulties,²¹⁻²³ hence focusing on school climate is potentially beneficial to children's mental health, in addition to other learning and school retention benefits.¹⁷⁻²⁰

One reason for the limited large-scale empirical studies on contextual school factors and child mental health is the lack of appropriately powered datasets with survey data on children's mental health combined with administrative data with both child- and school-level characteristics. In the current study, we use a large English primary school mental health survey dataset that has been linked with both the national pupil database (providing individual child-level sociodemographic information) and a national schools database

(providing data on the composition of schools) to investigate, (i) the association between school-level factors (both composition and climate) and children's mental health difficulties, controlling for individual level characteristics, and (ii) the potentially moderating role of child-level characteristics for the association between school-level predictors of children's mental health difficulties.

Method

Design

Secondary analysis of cross-sectional survey data from a large-scale school mental health survey in England linked to both pupil and school administrative records will be undertaken.

Participants

Children. A total of 23,215 participants (49.27% female, $n = 11439$) were included in the current study ($M_{\text{age}} = 9.06$ years, $SD = .56$). In each school, children in school year 4 or 5 were invited to participate in the study, with consent from their parents/guardians. Participant school records ethnicity comprised White (75.05%), Asian (11.79%), Black (6.57%), mixed (4.48%) and other (2.11%). Socioeconomic status was measured by the child's eligibility for free school meals (FSM, 23.5%, $n = 5455$).

Schools. Students from 648 state-maintained primary schools were included in the dataset used in the current analysis. The schools were selected by their local authority for a study examining mental health across schools in England.²⁴ An average of 35.83 participants per school ($SD = 18.66$, range 1- 110) were included in the study. Details of school characteristics are presented in Table 1.

From an initial sample of 24,565 cases, 221 cases (0.9%) were excluded from the analysis due to missing child-level demographic information (no National Pupil Database

linked data available). An additional 835 cases (3.6%) were excluded due to missing school composition information. Given the low levels (<5%) of overall missing data and the nature of the missing data we used all available cases for analysis ($n = 23,215$).

Procedure

Survey data were collected as part of the baseline of a randomised control trial and as part of an ongoing longitudinal study in the 2009-10 school year; this wider study is described elsewhere.²⁴ Teachers read a standardised information sheet to the children which held information on the study aims, confidentiality and the participants' right to withdraw, children then completed self-report measures online during the classroom session. Ethical approval for the data collection was received from the University College London research ethics board. Child socio-demographic characteristics were obtained by linking these data to the National Pupil Database. School composition information was obtained by linking these data to the EduBase national school database which contains information on school characteristics based on the school census. The data used in this study can be requested from the data holding institution by researchers.

Measures

Mental health difficulties. Symptoms were measured using the 10-item emotional difficulties and the 6-item behavioural difficulties scales of the Me and My Feelings self-report questionnaire.⁷ This community based screening measure of mental health difficulties has been designed to comprise easy-to understand items and is validated for use by children as young as 8 years.⁷ The measure has good content validity, internal reliability, construct validity and sensitivity,^{7,14} and has established thresholds indicating high levels of difficulties for each subscale, similar to some other population based mental health research.² Those children above threshold on either emotional or behavioural difficulties subscales are referred to as having 'high mental health difficulties' in this paper.

Child-level factors. Sex, socioeconomic status (SES) as measured by eligibility for free school meals (FSM), ethnicity (White, Black, Asian, mixed, other/unclassified), special educational needs (SEN) status, and age were controlled for in all analysis.

School composition. The linked national schools database included data on headcount (the number of children in the school), gender proportion (the proportion of girls in the school), school deprivation (proportion of students eligible for FSM). The available school ethnicity (proportion of ethnic minority children) data were incomplete and only available for some ethnic minority groups, hence we derived school ethnicity variable by aggregating proportion of ethnic minority students in each school.

School climate. Children completed a seven item self-report measure on their perceptions of their school climate (e.g., ‘We feel safe in school’).²⁵ Response options were ‘always’, ‘sometimes’ and ‘never’. Scores were aggregated at the school-level to be used as a school-level predictor and had a range of 0 to 14, with a higher score indicating a more positive school climate.

Analysis

Continuous mental health outcome variables (emotional and behavioural difficulties) were standardised to ensure comparability of regression coefficients in terms of size of effects. In addition, continuous school demographic variables were centred for the interaction analyses and the school climate variable was also standardised to aid interpretation. All analyses in the current study were conducted using STATA14.²⁶ A multilevel modelling approach was used to appropriately account for children nested in schools. We first estimate the proportion of variance in mental health difficulties accounted for by schools. We then estimate the associations of school-level characteristics with outcomes, controlling for child-level characteristics. Subsequently, we estimate interactions between school composition and climate and interactions between child- and school-level characteristics to examine whether

child characteristics moderate the association between school characteristics and outcomes. We assess incremental model fit using a log-likelihood test and estimate the intra-class coefficient (ICC) at each stage to estimate amount of school-level variance explained by school composition and climate.

Results

Table 1 presents the descriptive statistics for emotional and behavioural difficulties and school-level composition and climate variables. Analysis comparing these data with national characteristics of primary schools students²⁷ indicate that schools included in this sample have a similar proportion of children eligible for FSM (18.73% vs. 18.5% nationally) and ethnic minority students (22.67% vs. 21.5% nationally) and a larger headcount (304 vs. 241 nationally).²⁷

<Table 1 here>

Initial multilevel models estimate that approximately 3.1%, (95% CI: 2.5 - 3.9) of the variance in emotional symptoms, 4.4%, (95% CI: 3.7 - 5.3) of the variance in behavioural symptoms and 4.3%, (95% CI: 3.2 - 5.6) of the variance in children with high mental health difficulties is accounted for by schools before any school-level variables are accounted for. The percentage of school-level variation in outcomes accounted for by school composition factors was small (1.4% for emotional symptoms, 3.8% for behavioural symptoms and 1.9% for high mental health difficulties), while the percentage of school-level variation explained by school climate after accounting for composition was substantially higher (29.5% for emotional and 47.8% for behavioural symptoms, and 48.8% for high difficulties).

Including school-level predictors in the models, while controlling for child-level predictors (Table 2), indicated that school composition was not associated with mean levels of emotional symptoms. School SES was associated with behavioural symptoms and high

levels of difficulties, such that students in schools with higher proportions of disadvantaged students had on average greater behavioural difficulties and were more likely to have high (i.e., above clinical cut-off) levels of difficulties. A more positive school climate was associated with lower levels of emotional and behavioural symptoms, and lower likelihood of having high levels of difficulties (OR = 0.78 95%CI: [0.75-0.81]). There were no interactions between school composition and school climate in predicting mental health outcomes.

<Table 2 here>

For emotional symptoms an interaction between child SES and school SES was observed (see Figure 1a), such that disadvantaged children in a school with lower levels of disadvantage were more likely to have emotional symptoms, while non-disadvantaged children's emotional symptoms were not associated school SES. The association between school climate and emotional symptoms was moderated by sex (Figure 2a), such that while both boys and girls were more likely to have emotional symptoms if they were in a school with poor school climate, this effect was larger in girls compared to boys.

For behavioural symptoms, an interaction between child- and school-level SES (Figure 1b) was also observed. Unlike the interaction noted above for emotional symptoms, for behavioural symptoms high SES children in a school with higher levels of disadvantage were more likely to have behavioural symptoms, while for disadvantaged children levels of behavioural symptoms was unrelated to school-SES. In terms of school climate and sex, both sexes were more likely to have behavioural symptoms if they were in schools with poor school climate, but this effect was larger for boys compared to girls (Figure 2b).

Interactions between child- and school-level characteristics were also observed for those children with high mental health difficulties (i.e., above the cut-off for either emotional or behavioural symptoms). Child's sex moderated the association between school gender composition and high levels of difficulties, such that girls in schools with greater proportions

of female students had lower odds of having high difficulties compared to girls in schools with fewer females. While socio-economically disadvantaged children were more likely to experience high difficulties the magnitude of this effect was less pronounced in children in more disadvantaged schools. Finally, there was a school climate and sex interaction whereby the protective effects of school climate are larger for boys compared to girls.

Discussion

Children's mental health is a public health issue increasingly in the spotlight due to both its long-term impact on children's development, and frequent findings suggesting an increasing levels of difficulties experienced by young people today.^{28,29} Given the increasing focus on schools as a relevant context for prevention and intervention efforts,^{9,10} not enough is understood about the extent to which schools influence children's mental health. In the current analyses we investigate the associations between children's mental health and both school composition and climate. Composition reflect schools' socio-demographic characteristics, while school climate reflects the degree to which students feel a sense of belonging to, have positive perceptions of and feel safe in their school. We use large-scale survey data of children's mental health from over 600 schools, linked to the pupil and school national databases to investigate the school-level variation in mental health, how much of this is explained by school composition and climate and whether the association of school-level factors are moderated by child-level socio-demographic factors.

Schools accounted for 3-5% of the variation in children's mental health. Of this a small amount was explained by school compositional factors (1.4 to 3.8%). School size was associated with slightly raised odds of high difficulties, however, the effect size was small (odds of 1.03 for an additional 100 students). School deprivation predicted behavioural symptoms and rates of high mental health difficulties, supporting previous research where

schools with higher levels of disadvantaged children have an increased risk of individuals with behavioural difficulties regardless of a child's individual socio-economic position.³⁰ It has been suggested that schools with higher proportions of disadvantaged students may have certain characteristics which increase risks for poor student behaviour, such as higher teacher turnovers, less effective management and less rigorous school curriculum.³¹

Compared to school composition, school climate was associated with all mental health outcomes, with more positive school climate associated with a tenth of a standard deviation lower emotional and behavioural symptoms and children at these schools were around 25% less likely to experience high levels of difficulties. This supports existing literature studying the impact of the quality of the school environment for children's mental health.²² One-third to one-half of school-level variation in mental health was explained by school climate, highlighting the importance of school climate as a target for intervention. Analyses examining moderation by child-level characteristics suggest that the association of school climate with mental ill-health is moderated by child sex, such that worse school climate is associated with greater levels of mental health problem more typically associated with each sex, that is behavioural difficulties for boys and emotional difficulties for girls.

Interactions between school characteristics and child socio-demographic factors were also explored by assessing whether any child-level characteristics moderated the association between school-level factors and mental health. We found that a socio-economically disadvantaged child in a relatively non-disadvantaged school had higher levels of emotional difficulties while, comparatively, socio-economically non-disadvantaged children had similar rates of difficulties irrespective of their school's SES level. This suggests that the higher SES of a school magnifies the likelihood of emotional symptoms for disadvantaged children. The inequality between a disadvantaged child in a non-disadvantaged school may prompt negative social comparisons which have been shown to be associated with poorer mental

health outcomes.^{14,32} Individual by school-level disadvantage effects on mental health were also seen in the context of behavioural symptoms. However, in contrast to emotional difficulties, the moderation was observed in non-disadvantaged students showing greater behavioural symptoms in more disadvantaged schools. The effect size for the moderation of child by school SES was larger for behavioural symptoms compared to emotional symptoms.

Strengths of the current study include a large sample of schools, child mental health data linked to national child and school databases and the inclusion of different domains of child mental health. Nonetheless, some limitations deserve note. First, schools included in the study were slightly larger in terms of headcount compared to the national average, and only state-maintained schools were included in the dataset. However, given the large number and range of schools and children included in the sample and the included schools being similar to national figures on proportions of disadvantaged and ethnic minority students, it is likely that these findings are generalisable to primary schools nationally. Second, school climate was aggregated from student responses regarding their school, potentially leading to higher estimates of the school-level variation in children's mental health scores explained by this variable. Although our measure of school climate captures key components of school climate including safety, positive adult-student relationship and morale; some aspects included in the broader conceptualisation of school climate,¹⁷ such as the structural elements of the school like space, building materials and aesthetics were not assessed. Future research exploring the role of these physical environment aspects of school climate on child mental health is needed. Lastly, due to the size and population-based nature of the study, clinical interviews are not used to assess mental ill-health, instead we relied on validated self-report questionnaires.

Currently, the majority of school-based mental health interventions are expensive to deliver with specific copyrights and associated training or manuals and, importantly, have limited evidence for their efficacy.³³ In contrast, a focus on improving school climate might

provide an accessible and actionable target that is also low cost to help promote students mental health. Future research should investigate the influence of malleable, contextual school factors other than school climate (such as policies, leadership, teacher quality) in association with child- and school-level demographics in influencing child mental health outcomes. Schools are increasingly facing an expanding remit that includes supporting the rising mental health difficulties faced by their students.^{9,10} Constraints on school budgets and squeezed timetables further compound the issue and reduce scope for the delivery of mental health focused interventions within schools. Tackling school climate is an attractive focus for improvement as, not only does it not necessarily place demands on curriculum time, it is within the scope of schools' remit and has potential benefits for other outcomes such as school engagement and academic outcomes alongside mental health difficulties.

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Table 1 Descriptive statistics of mental health outcomes (n=23215) and school composition and climate (n = 648) showing means (with 95% CI) and ranges.

	Mean (or %) (95% CIs)	Range (10 th and 90 th percentile)
<i>Mental health outcomes, children (n = 23215)</i>		
Emotional symptoms score	6.78 (6.73, 6.82)	0 – 16 (2, 11)
Behavioural symptoms score	3.18 (3.15, 3.21)	0 – 12 (0, 7)
% above clinical threshold	16.84 (16.4, 17.3)	–
<i>Schools (n = 648)</i>		
School headcount	304 (293.5, 314.5)	29 – 1212 (160, 471)
School gender (proportion female)	48.45 (48.1, 48.8)	0 – 60 (44.3, 52.9)
School deprivation (proportion FSM eligible)	18.73 (17.7, 19.7)	0 – 87.5 (3.9, 37.4)
School ethnicity (proportion ethnic minority)	22.67 (20.5, 24.8)	0 – 100 (0, 74)
School climate	11.77 (11.7, 11.8)	7.03-13.82 (10.76,12.77)

Note: CIs = confidence intervals

Table 2. Regression coefficients (with 95% CIs) from 1) model with school predictors controlling for child level socio-demographic characteristics, 2) model 1 plus interactions between school composition and corresponding child factor, 3) model 1 plus interactions between child socio-demographic characteristics and school climate

	Emotional symptoms Coef (95% CI)	Behavioural symptoms Coef (95% CI)	High mental health difficulties Odds ratio (95% CI)
<i>From model with child level controls and school level predictors</i>			
School headcount (per 100 children)	0.0 (-0.01,0.02)	-0.01 (-0.02,0.01)	1.03 (1.00,1.06)
School gender (% female, 10%)	-0.02 (-0.07,0.02)	0.04 (-0.01,0.09)	1.04 (0.92,1.17)
School deprivation (% fsm eligible, 10%)	-0.02 (-0.03,0)	0.02 (0.01,0.04)	1.05 (1.01,1.09)
School ethnicity (% ethnic minority, 10%)	0.0 (-0.01,0)	0.0 (-0.01,0.01)	0.99 (0.97,1.01)
School climate (1 SD)	-0.09 (-0.11,-0.08)	-0.13 (-0.15,-0.11)	0.78 (0.74,0.81)
<i>From model adding interactions between child characteristics and corresponding school level factor</i>			
School gender % x child sex (female)	-0.06 (-0.13,0.02)	-0.07 (-0.14,0)	0.77 (0.62,0.96)
School ethnicity% x child ethnicity (BME)	-0.01 (-0.02,0.01)	0.01 (0,0.02)	1.02 (0.98,1.06)
School deprivation % x child deprivation (FSM)	-0.03 (-0.06,-0.01)	-0.05 (-0.07,-0.02)	0.90 (0.84,0.96)
<i>From model adding interactions between child characteristics and school climate</i>			
School climate x child sex (female)	-0.05 (-0.08, -0.01)	0.10 (0.07,0.13)	1.13 (1.02,1.24)
School climate x child age	-0.04 (-0.07,0)	0.02 (-0.01,0.06)	1.03 (0.93,1.13)
School climate x child ethnicity (BME)	0.04 (-0.01,0.08)	0.02 (-0.02,0.07)	1.09 (0.96,1.23)
School climate x child deprivation (FSM)	0.02 (-0.02,0.06)	-0.03 (-0.07,0.01)	1.03 (0.93,1.15)
School climate x child special needs (SEN)	-0.04 (-0.08,0)	-0.04 (-0.07,0.00)	0.98 (0.89,1.08)

Note: BME = black, minority ethnic, FSM = free school meals, SEN = special educational needs. All models controlling for child sex, age, ethnicity, socio-economic status and special education needs status

Figure 1a and 1b showing interactions between child SES (FSM eligibility) and school level deprivation in predicting emotional (1a) and behavioural symptoms (1b)

Figure 2a and 2b showing interactions between child sex and school level school climate in predicting emotional (2a) and behavioural symptoms (2b)