

SUMMARY

Background

The question of the optimum size of school has received considerable attention in recent years. In England, the introduction of quasi-market conditions in English secondary education theoretically allows schools to expand or contract in size in accordance with parental preference. In the USA, there is a growing 'small schools advocacy' movement which has a high media and political profile. Whilst the research evidence base appears to be quite large, it is disorganised, often partial and characterised by conceptual, practical and methodological differences.

Aims

- To produce a systematic map describing the range of research investigating the impact of school size on a range of student, teacher and school outcomes
- To produce an in-depth review focusing on comparing outcomes between schools of different sizes¹
- To consider implications from the review in terms of research, policy and practice

Methods

Due to the restrictive timeframe available for the project, the majority of studies were identified through searching bibliographic databases. There was no systematic use of personal contacts, websites, journal handsearching, or citation-checking. Criteria were used to restrict the included studies to those which contained empirical data, investigated outcomes which included school size or schools-within-schools; included a variable for school size; were written in English; were conducted in an OECD (Organisation for Economic Cooperation and Development) country; and were published post-1980. Included studies were keyworded, using both generic and review-specific keywords to create a 'map' of the research literature. For the in-depth review, a further set of criteria was applied to the studies in the map.

Studies were excluded from the in-depth review if the focus was schools-within-schools; the number of schools in the sample could not be ascertained; data were collected before 1990 (except where they were collected over a time span that included 1990), the analysis did not control for socio-economic status (SES), or the study did not focus on one or more of the following outcomes: (i) student attainment and progress, attitudes, behaviour (ii) teacher morale and experience, (iii) school organisation, management and costs, or the sample comprised only higher attaining or advanced students. The studies in the in-depth review were subjected to generic and review-

¹ Such comparison may imply causality. The research is, however, based on study designs which are appropriate for considering associations rather than effects. Hence, where we have used the word effect, we have put it in inverted commas ('effect') to indicate the problematic nature of concept in this context.

specific data-extraction, including assessments of the weight of evidence (WoE) each study lent to the review. Quality-assurance was carried out at the screening, keywording and data-extraction stages.

Results

Nearly 4,000 reports were identified as potentially relevant to the review. These were screened against the inclusion criteria. 3,503 reports were excluded and 252 were not available in time for the review. The remaining 134 reports of 119 different studies were then keyworded. The final map included only nine studies from the UK and showed a scarcity of relevant studies looking at the range of outcomes of interest for the review. In particular, there were too few for a separate analysis of the schools-within-schools literature.

Thirty-one studies were included in the in-depth review. Two-thirds of the 31 studies were from the USA and one-fifth from England. Nine of the 31 studies were judged to give high/medium WoE to answering the review questions, and five were judged to be low or low/medium. The majority of studies examined the 'effects' of school size on achievement without controlling for prior attainment (N=15); four studies examined achievement whilst controlling for prior attainment; 13 studies examined student attitudes and behaviour; five examined economic outcomes; two examined school organisation outcomes and two examined the perceptions of teachers.

Relationship between school size and achievement* without prior attainment

- Of the 15 studies that do not take into account prior attainment when considering the 'effects' of school size on achievement, approximately half show a positive relationship and half show a negative relationship with school size.
- The only English study in this category found that achievement increases as school size increases up to approximately 1,200 (for 11-16 schools) or 1,500 (for 11-18 schools) students (a quadratic relationship). After this point, achievement decreases as size increases.
- The majority of these studies do not report any statistically significant² association between school size and achievement.

Student achievement* whilst controlling for prior attainment

- Four studies in this section found that student achievement increases as school size increases up to a particular point (or range). After this point, student achievement decreases as school size increases.
- The point estimate or range of school size at which achievement is maximised varied within and between these studies. The optimum school size estimate ranged from 600 to 2155 and the optimal year group size ranged from 150 to 225.

Student behaviour and attitudes

- One study with a high/medium weight of evidence found that overall absence was lower in schools with up to approximately 1,400

* Student achievement in the studies in this review is confined to exam performance.

² The concept of statistical significance in this context is not unproblematic (see sections 1.4, 4.5 and 5.2.2).

students. After this point, overall absence appeared to increase as school size increased.

- Studies with a lower weight of evidence tended to find a negative association with school size: that is, an increase in the dropout rate and a reduction in attendance as schools get larger.
- All the studies considered found a negative association between students' feelings of engagement, connectedness and participation, and increased school size.
- Studies investigating the relationship between school size and violent student behaviour had somewhat contradictory findings. Some types of violent behavior increased as school size increased, whereas other types of violent behavior decreased as school size increased.
- The results suggest many of these relationships are comparatively weak, and are difficult to quantify and conceptualise.

Teacher perceptions of school climate and organisation

- Comparatively few studies included in the in-depth review included measures of the impact of school size on teachers.
- Results suggest that teachers in smaller schools tend to have more positive perceptions of school climate, of their abilities to influence school policies and control their classrooms, of school norms; teachers also perceive greater co-operation and more resource availability.

School organisation and structure

- Comparatively few studies in the in-depth review included measures of the impact of school size on elements of school structure and organisation. The two studies that did include such outcomes used very different measures and are not comparable.
- One study found that, as school size increases, so too does the *construct* of class size based on average class size, student teacher ratios and teachers' perceptions of satisfaction with their class size.
- The second study found that students in smaller schools may be more likely to be entered into higher tiers for mathematics, but not for science, and that some students in smaller schools may be less likely to be entered for some GCSE subjects. However, this pattern was not consistent across different subject areas.

Economic outcomes

- The studies in this category show a consistent negative relationship between average secondary school size and costs defined as direct public expenditure on schools.
- One study, despite finding the same negative relationship with average secondary school size, found that the relationship between size and costs was different between schools of different types. Relationships based on 'average' cost figures for all schools may not apply to particular types of school.
- The size of the relationship between average secondary school size and costs differs slightly between studies. An increase in school size of 10% is estimated to reduce costs per student by between 1% and 4%, depending on the definition of cost used.
- Studies of economic outcomes have considered only a limited range of costs (direct public expenditure on schools per student) and a limited range of outputs or benefits (cost per graduate, inefficiency).

Conclusions

The review question is concerned with the overall relationship between secondary school size and outcomes. At this macro- or global level, the review findings suggest that there is no overall consistent relationship between secondary school size and outcomes. However, at the level of the individual outcomes, the pattern of findings which emerged suggests that we can be reasonably confident that exam attainment is maximised and absence is minimised at a certain point in the range of secondary school size. Further, in the limited terms of expenditure per student, costs decline as schools get larger. However, they also suggest that teacher and student perceptions of school climate decline and some kinds of violent behaviour may increase. The design of the studies included in this review cannot definitively establish causal relationships and thus the direction of causal relationships is a problem for all the outcomes reported. Does the number of students determine cost or does cost determine the number of students? Does school size determine attainment or does attainment determine school size?

There are three key issues which remain more unclear than the directions of 'effects' results suggest. Firstly, even if the interpretation given above is accepted, to be of practical use we would need to know at what size attainment was maximised and/or absence minimised. The studies here do not provide a clear answer to this as the range reported is quite wide, especially in relation to the actual size of secondary schools in England.

Secondly, does the 'average' direction of 'effect' apply to all school/student types? There is some suggestion from the studies in the review that it may not, although there may be differences between the USA and England on this point.

Thirdly, we would want to know the 'effect' of planned or unplanned changes in the size of an individual school. Such an analysis would need to include not only the 'effects' on the school that had changed size, but also 'effects' in neighbouring schools.

This review would seem to refute some of the more prevalent myths regarding the advantages and disadvantages of smaller and larger schools. For example, that student achievement is universally higher in smaller schools and that student behaviour is universally worse in larger schools have been shown to be inconsistent with the current evidence. The relationship appears to be much more complex than such simple arguments suggest.

Strengths and limitations

Strengths

The main strength of the review lies in its systematic and comprehensive nature. The process of systematically identifying, screening and critically appraising the studies helps to ensure that the review process is transparent, replicable and updateable. Another strength is the presentation of the review results in terms of directions of effect, which facilitates direct comparison across

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studies with similar outcome measures for perhaps the first time in this topic area. Another important strength is the involvement of the commissioners of the review, especially at the point of moving from the map to the in-depth review. This helped to make the review more policy-relevant.

Limitations

The remit of this review extended only to a consideration of studies that investigated empirically the association between an outcome variable and school size. These were all quantitative studies. This meant that qualitative studies that investigated in more depth the *processes* whereby school size might be related to differing socio-cultural and organisational climates, or staff, student and community relationships were not included. This is a limitation imposed by the agreed focus of the review question rather than the review process itself, but means that little contribution is made to discovering why school size might affect outcomes.

The review process itself had a number of limitations. The truncated form of searching that was carried out because of the restricted timescale for conducting the review (with the cut-off date for retrieval of reports), may have resulted in missing some relevant studies, although it is difficult to estimate the extent of this problem. Since the application of inclusion criteria, keywording and data-extraction were carried out by two reviewers independently in only a sample of cases, the possibility of reviewer error was greater than if all these procedures had been carried out independently for all studies. However, the information extracted from the papers was continually being re-examined by different members of the review group during the process of analysis and synthesis, thereby minimising the risk of error and improving the data quality.

Most of the studies identified for inclusion in this review were taken from USA state data. Within the USA, there is much wider variation in the size of school, and differences in the socio-economic and cultural contexts of schooling. Taken together, these differences may limit the generalisability of conclusions to the UK context. The meaning and use of statistical significance is also difficult to interpret in this review because many of the study findings included all schools in a population as their 'sample'. Another important limitation of the findings is that the individual studies in the review only measured a limited range of outcomes. Attainment, cost and benefit in particular were conceptualised and measured in a limited way.

Implications

This review does not provide evidence to support policy initiatives that solely aim either to increase or to decrease the size of schools and/or to close or change the structure of schools below or above a certain size. Where policy options could have an impact on school size (e.g. through the expansion or retraction of school size through the option of parental choice), it would seem reasonable to make all stakeholders aware that, at some point, the characteristics which make a school appear desirable may be lost if the school's size changes dramatically.

Further research on the relationship between school size and a broad range of educational outcomes is required, using both quantitative and more in-depth qualitative analyses. It is important that future research builds on existing research both substantively and methodologically.

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Schools-within-schools may have the potential to offer the benefits of both small and large schools by maintaining several 'small' schools within the same school site. However, there appear to be few rigorous evaluations of such initiatives. Future schools-within-schools initiatives should be accompanied by rigorous evaluation.