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Class size, pupil attentiveness and peer relations

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ABSTRACT

Background

Despite a long-running debate over the effects of class size differences on educational performance there is little evidence on the classroom processes that might be involved.

Aims

The effects of class size differences are examined in relation to social and behavioural adjustment to school, in terms of two dimensions: attentiveness and peer relations. It was predicted that as class size increased there would be more inattentiveness in class and more signs of social difficulties between children in the form of more rejection, asocial, anxious and aggressive behaviour, and less prosocial behaviour.

Samples

Data came from a large-scale longitudinal study of children over KS1 (4-7 years). The observation study was based on a sub-sample of 235 children in 21 small (average 19 children) and 18 large (average 33 children) reception classes (aged 5 years). The PBR sample involved over 5000.

Methods

There were two complementary methods of data collection: first, a systematic observation study of pre-selected target children in terms of three 'social modes' - when with their teachers, other

children and when not interacting – and in terms of work, procedural, social and off task activities; and, second, a teacher administered Pupil Behaviour Rating (PBR) scale comprising over 50 items rated on a three point scale grouped into six ‘factors’: hyperactive/distractible, aggressive, anxious/fearful, pro-social, asocial, and excluded.

Results

Observations showed that children in large classes were more likely to show off task behaviour of all kinds, and more likely to interact with their peers in terms off task behaviour, social, and also on task behaviours. Connections between class size and PBR factors were not strong, but there was a slight though consistent tendency for worse peer relations, in terms of aggression, asocial and excluded, in the smallest classes.

Conclusions

There was confirmation that children in large classes are more distracted from work and more often off task. The unexpected result, based on teacher ratings, that small classes may lead to less social and more aggressive relations between children is discussed, along with implications for teachers of a tendency for more peer related contacts in large classes.

INTRODUCTION

The effect of class size differences on young pupils in school can be considered conceptually in relation to two main aspects of adjustment to school. First, and most obviously, adjustment can be seen in terms of academic progress. The acrimonious debate over the educational consequences of class size differences has centred on the effectiveness of class size reduction initiatives in improving children's academic performance (Grissmer, 1999). The most widely quoted research is the experimental Tennessee STAR project which found that smaller classes, at least below 20, and for the youngest children in school, have positive effects on pupil academic performance (e.g. Finn & Achilles, 1999, Nye, Hedges & Konstantopoulos, 2000). In the UK, current Government policy is for a maximum class size of 30 at Key Stage 1 (4-7 years), but this still leaves a good deal of variability in class sizes, and concerns over the effects of larger classes remain.

However, adjustment to school can be seen in a second way, in terms of social and behavioural adjustment. Though there are some suggestions of classroom processes connected to class size differences, research evidence is patchy (Blatchford & Martin, 1998), and there is little understanding of classroom processes, including social and behavioural factors, that might be involved (Grissmer, 1999). It might be expected that in larger classes there will be more distractions and, with more children bidding for the teacher's attention, they will be more likely to be inattentive and off task, and relations between children may suffer. In this paper these

expectations are tested systematically.

The importance of a child's early social and academic adjustment to school has been recognised in Britain for some time. Research was conducted at the end of the 1970s on factors influencing successful transition into infant and first school (e.g. Cleave et al, 1982) and nursery school (Blatchford et al, 1982). But a number of factors have led to a renewed interest. Recent initiatives in the U.K. regarding school entry assessments has encouraged interest in more precisely assessing children's adjustment to school, soon after entry. Schools in England enter children in the year within which they are five, and some of these children are only just four years old on entry. There are concerns about the appropriateness of existing teaching methods, class sizes and staffing. Concerns with behaviour and indiscipline in schools have also heightened awareness of problems posed by some young children in school. There appear to be signs that difficult behaviour in schools is increasing. Day, Tolley, Hadfield, Parking, & Watling (1996) review research linking class size with pupil behaviour and argue that large class sizes are at odds with a wish to improve behaviour in schools and help management of problem behaviour.

One theme of several studies is that in smaller classes behaviour is better and classroom management of behaviour is easier (Cahen et al in Cooper 1989, Carter in Cooper, 1989, Filby in Klein 1981). Pate-Bain, Achilles, Boyd-Zaharias & McKenna (1992) report, on the basis of diary records of teachers involved in the pre-STAR research, that there were fewer student interruptions, and potential discipline problems were identified and solved more quickly. Bennett (1996), in a survey of the views of teachers and others reports that teachers believe

larger classes adversely affect behaviour in class. Glass, Cahen, Smith & Filby (1982) found in their meta-analysis that there were fewer misbehaviours in smaller classes.

In this paper social and behavioural adjustment in relation to class size is considered in terms of two dimensions: attentiveness in class and peer relations. Results come from a large-scale longitudinal study of class size differences, based at the Institute of Education, University of London.

1. Attentiveness in class

Regardless of any connection with class size, many studies show that a key aspect related to educational achievement is attentiveness, active learning time, time on task or some equivalent term (e.g. Creemers, 1994, Rowe, 1995). It seems clear that pupils will learn to the extent that they are attentive to the topics being discussed or the work presented to them, and common sense would suggest that with more children in the class there will be more potential for distraction, and more possibility of being off task. Cooper (1989), in his review of evidence, found several studies which showed that pupils in smaller classes attend more and spend more time on task (Cahen in Cooper 1989, Carter, 1984 in Cooper 1989, Klein 1985). Finn & Achilles (1999) have argued that the benefits of small classes are primarily in terms of increased student engagement in learning. But this conclusion is based on a follow up at grade 4 of the STAR sample (i.e., after the experimental intervention had ended). They admit that further research is needed on the connection between class size and student engagement. It might also be noted that Shapson et al (1980), in a systematic observation study, did not find that pupils in smaller classes participated more in assigned tasks.

There is a need to clarify constructs used to measure class size effects on attentiveness. If large classes cause children to be more distracted this could take two forms: first, an externalising form in the sense of overtly disruptive behaviours and ‘mucking about’, or, second, a more internalising form in the sense of being disengaged and distracted from work. These two forms of behaviour are recognised as distinct in studies of behavioural difficulties where 'externalising' behaviours, for example, conduct problems, hyperactive and distractible behaviour, are distinguished from 'internalising' behaviours, such as those of an anxious-fearful nature. There is a good deal of evidence, extending over several decades, that pupils' externalising behaviour problems, in the form of disruptive and maladjustment problems, are connected to low achievement (see Rowe, 1995). As measured by Ladd & Profilet (undated), distractible/hyperactive behaviours are externalising forms of behaviour that conceptually overlap with lack of concentration and inattentiveness in class. It was hypothesised that as class size increased distractible and inattentive behaviour would also increase.

There is a more subtle distinction that might need to be made in terms of distractible behaviour and aggression. Many researchers have found close links between aggression and hyperactive/distractible behaviours. Some have combined these in one factor, as externalising behaviours or conduct disorders. St James-Roberts, Singh, Lynn & Jackson (1994), along with others, combine aggressive behaviour and conduct disorder in one factor, but McGuire & Richman (1986), on the basis of a pre-school sample, found some distinction between these two dimensions, and others have also separated them. Although it is likely that the two forms of behaviour overlap, Ladd & Profilet (no date) argue that aggression and hyperactive/distractible

behaviours should be considered as distinct. In this study these two components are measured separately in relation to class size.

2. Peer relations

There is little systematic research on the effects of class size differences on peer relations, though there are suggestions that large class sizes, or large pupil:staff ratios, can adversely affect the quality of relationships between very young children. Research on children at nursery level indicates that less favourable pupil:staff ratios can lead to more negative relations between children, including more aggression, annoying and teasing (Smith, McMillan, Kennedy & Ratcliffe, 1989). Smith & Connolly (1980) found that there were higher levels of aggression when there is more overcrowding in pre-school settings. But other research with older pupils seems less clear. And Shapson et al (1980), in a study of grade 4 and 5 children, found no difference between different sized classes in conflicts between pupils.

In considering the effects of class size on relations between children it is important to take note of the extensive literature on peer relations, stemming from developmental social psychology. While there is not space to review this work here (see Rubin, Bukowski, & Parker, 1998) there is a lot of evidence that children's early social behaviour toward peers is an important predictor of later social and personal adjustment (Parker & Asher, 1987). The effects of children's prosocial, withdrawn and aggressive behaviours toward peers have received most empirical support.

Prosocial behaviour is an important predictor of children's social adjustment, and has been found

to relate to the development of friendships (see review in Ladd & Profilet, no date). In one study, it was reported that children in smaller classes were more appreciative of each other and showed an increased desire to assist one another (Pate-Bain et al, 1992). In the present study, it was hypothesised that as class size decreased there would be more signs of pro-social behaviours between peers.

In the case of withdrawn behaviours, it is important to be clear about allied but distinct behaviours. Although withdrawn behaviour is often taken as a single dimension, on conceptual grounds different facets need to be distinguished. Rubin & Asendorpf (1993, in Ladd & Profilet, no date) have distinguished three forms: first, there are children who prefer to play alone, and can be called 'asocial'; second, children who are rejected or excluded by other children; and, third, children who are wary or fearful of other children. Each of these types of withdrawn behaviour may have different origins and different relationships with later functioning.

Withdrawn behaviour might be expected to be made worse by larger classes, and it may be more difficult for teachers in larger classes to keep an eye on, and seek to draw out, children who are withdrawn, let alone find the time to distinguish between different forms of withdrawn behaviour. On the basis of the work just described we distinguished between three forms of withdrawn behaviour and hypothesised that as class size increased asocial, excluded/rejected and anxious/fearful behaviours would also increase.

There is also considerable support for the importance of aggression as a factor in predicting later maladjustment (Parker & Asher, 1987). Aggression in early life consistently emerges as one of

the best predictors of later maladjustment, including peer rejection, delinquency, criminality, mental illness, underachievement and dropping out of school (Parker & Asher, 1987, Coie & Dodge, 1998). As described above it may be important to separate aggression from distractibility. One reason for this is that in school contexts aggression, but not necessarily distractibility, is usually reflected in relations with other children.

In addition to the literature on peer relations, there is also a separate and large literature on collaborative or co-operative group work in classrooms. Again there is not space to review this here (see review in Slavin, Harley & Chamberlaine, 2000). Naturalistic studies of children's interactions in classrooms, show that much learning in classrooms takes place in groups with other children, though many have commented that the extent of collaborative group work is limited (e.g. Galton, Simon & Croll, 1980, Tizard et al, 1988). In this study, we wanted to examine the extent to which class size differences affected peer interactive work-related behaviours. It might be expected that in larger classes teachers would be less able to monitor and control behaviour and that along with other distractions, children will engage in more social and off task behaviours with each other. In larger classes, teachers may more easily miss squabbles between children.

The various concepts concerning children's behaviour and social relations in class are therefore complex. Measures of classroom behaviour, peer relations, and school adjustment overlap with each other and need to be conceptualised and measured carefully so that similar but different behaviours are treated separately. There is recognition that the most widely used scales need attention. Ladd & Profilet (no date) have argued that items concerning peer relations and non-

peer related items have sometimes been lumped together. Although general measures of adjustment to school have been developed (Thompson, 1975), we felt that conceptualisation of adjustment to school needed to take account of recent research on children's social and behavioural difficulties and research on social relationships, described above. One aim of this study, therefore, was to develop a conceptualisation of, and a means of measuring, social and behavioural functioning in classrooms, including peer relations, likely to be affected by size of class.

Aims of the study

On the basis of a review of the literature the following aspects of social and behavioural classroom behaviour were investigated in relation to size of class:

1. pupil inattentiveness
2. relations between children in terms of:
 - a. asocial
 - b. excluded
 - c. anxious/fearful
 - d. aggressive behaviour
 - e. pro-social behaviour

In line with research reviewed above, the strongest prediction was that there would be a tendency as class size increased for children to show more signs of being inattentive and off task. We also predicted that there would be more signs of social difficulties between children as class size increased, in the form of more rejection and asocial behaviour, less prosocial behaviour, more

signs of anxious behaviour, and more aggressive behaviour, though previous research does not allow firm predictions about this.

Research approach

Previous research is limited in two main ways. One problem is the diversity of research methods used. Different research studies use different research approaches, e.g. teacher report and interviews, teacher accounts of time spent, and observation studies. These focus on different aspects and integration of findings then becomes difficult. Also, methods used in studies are not always clearly described or adequate. Much is relatively anecdotal and based on open-ended reported experience of individual teachers. Though valuable, there are questions about the validity and generalisability of such views, especially given Shapson et al's (1980) finding of discrepancies between teacher reports and classroom observation data. It seemed to us that an advance in understanding connections between class size and teaching would be to use a multi-method approach which, in this paper, would combine use of carefully designed teacher ratings of child behaviour (rather than open ended reports) and systematic classroom observations. The systematic observation data provided for each child frequencies task and non-task related behaviours directed at teachers, other children and when not interacting, while the teacher ratings provided qualitative judgments of selected aspects of peer relations. The two forms of data collection were designed to cover allied but different aspects of attentiveness and peer relations in school.

Another feature of the research approach used in this study concerns the overall research strategy. Elsewhere we have reviewed research methods used in studies of class size effects

(Blatchford, Goldstein & Mortimore, 1998, Goldstein & Blatchford, 1998), and have identified limitations which make interpretation of relationships between class size and outcomes problematic. It is often assumed that experimental designs, and randomised controlled trials (RCTs) more specifically, are superior, and necessary to provide the basis for causal interpretations. However, RCTs can themselves be questioned (Goldstein & Blatchford, 1998). The overall strategy in the Class Size Project has been to employ a longitudinal research design, random selection of participating schools, and a systematic approach to capturing information on classroom processes affected by class size. A naturalistic design can be more useful in addressing policy issues in that it is more 'authentic', and reflects adjustments and processes as they occur under normal circumstances. The study had two aims, overall: to examine connections between: a) size of class and pupils' progress, and b) size of class and classroom processes, such as teacher and pupil behaviour, within class grouping practices, teacher self perceptions, assessment and record keeping. In this paper we focus on connections between size of class and pupil attentiveness and peer relations. In other papers we look at class size and within class grouping practices (Blatchford, Baines, Kutnick & Martin, 2001); class size and teaching (Blatchford, Moriarty, Edmonds & Martin, in press), class size and teacher's professional self perceptions (Moriarty et al, 2001), and class size and academic progress over the reception year (Blatchford, Goldstein, Martin & Browne, in press).

METHOD

Sample: schools, classes and children

The overall Class Size Project followed for three years a large cohort of pupils who entered

reception classes during 1996/7, and a second separate cohort of pupils who entered reception classes one year later during 1997/8. At the start of the project there were, in Cohort 1, 7142 pupils in 330 classes in 199 schools in 9 Local Education Authorities (LEAs). The second cohort comprised 4244 pupils in 212 classes, in 134 schools in 6 LEAs. The children were followed for the whole of KS 1, that is, through the three years: reception, Y1 and Y2. The research design involved a random selection of schools within the participating LEAs. All children entering reception in a selected school during the year were included in the study. At the start of the study 49% of the sample were female and 51% male, 17% were eligible for free school meals (a measure of low family income), the vast majority (97%) spoke English as a first language, and most (91%) were classified as from White UK ethnic backgrounds. Schools were either all through primary schools (i.e., children aged 4 – 11 years) – 74% - or Infant schools (i.e., children aged 4 – 7 years) – 26%.

There were a number of forms of data collected in the study, including start of school and end of year pupil academic assessments, termly teacher completed questionnaires, teacher and headteacher completed end of year questionnaires, Pupil Behaviour Ratings on each child in the study, and systematic observations and case studies conducted on sub samples of the main sample. For this paper we have made use of two types of data: systematic observations in classrooms and teacher completed Pupil Behaviour Ratings. Data on school entry attainments and eligibility for free school meals are also presented.

Systematic classroom observations

Because of the labour intensive nature of systematic observation data, and because the first year

of school was of particular interest, the observation component reported in this paper involved a sub-sample of reception classes from Cohort 1. Three of the participating LEAs were approached and agreed to take part in the observation component. Schools were selected on the basis of information already provided on class sizes. Classes with small (20 or under) and large (30 and over) reception classes were identified and a random selection of schools with such classes approached to see if they were willing to take part. The aim was to get forty classes, divided between large and small classes. In the event 39 classes in 27 schools with the required characteristics agreed to take part. There were 18 large and 21 small classes. Those identified as small classes had on average 19.4 children and those identified as large classes had 32.5 children on the register, according to the observer notes at the time of the observations. For each class, observers were provided with the names of six children – three boys and three girls - randomly chosen by the researchers, along with two reserves to be observed in cases where the sample children were absent. In the event there were observations on 235 children (one class had observations on 7 children).

A systematic observation schedule developed in previous research (Blatchford, Burke, Farquhar, Plewis & Tizard, 1987, Tizard, Blatchford, Burke, Farquhar & Plewis, 1988) was used. This involved direct, i.e. on-the-spot, observations of selected children in terms of previously developed categories and in terms of 5-minute observation sheets divided into continuous 10-second time samples. The schedule was child-based in the sense that one child at a time was observed, the ‘target’ child. The aim was to provide a description of the child’s behaviour; teachers and other children were observed only when they came into contact with the target when he/she was being observed. The schedule involved categories that provided a description

of time spent in three 'social modes' - when with their teachers, other children and when not interacting. Within each of these three 'modes' sub-categories covered work, procedural, social and off task activity. A list of categories in the schedule is shown in Appendix 1. In this paper we concentrate on the child-child categories and total off-task behaviour. Teacher child interactions are described in Blatchford, Moriarty, Edmonds and Martin, 2002). A 'predominant activity sampling' method was used (the most prevalent category within a sub-set of categories was coded) and observers recorded behaviours by ticks on observation forms (see Blatchford et al, 1987 for more details).

The basic principle was to observe during classroom-based work activities, i.e. those parts of the day when language, maths, other work like craft and painting, and free play in the classroom could have taken place. The aim was to observe the 6 children in each class 5 times per day, for three days. In the event the average number of completed observation sheets per child was 14, and there were 3,238 sheets overall. This amounted to 97,140 10-second observations overall (30 per sheet), and there were on average 413 of these observations per child (this number fell a little short of the theoretical maximum – 450 – because of missing data, observer error and codes not being readable). In terms of time there were 69 minutes of observation per child, which amounted to 270 hours for the whole sample. Observations were conducted over a period of a few weeks at the same time during the Spring term. Observations within classes were as far as possible on consecutive days, though this was not sometimes possible because of events in schools, that kept children out of class, e.g., rehearsals in the hall, and child absences requiring revisits.

Observers were recently retired senior teachers and headteachers, contacted through participating LEAs, who then received initial training, practice observations in a reception class not involved in the study, and then a follow-up training session. Reliability checks were carried out through the training sessions. A reliability study carried out in earlier work showed that observer agreement for the main sets of mutually exclusive categories was high. Teacher-child 'social setting', 'child role', 'teacher content', child to teacher 'child contribution', 'child content' and 'not interacting' all had reliability coefficients (kappa) greater than 0.80. Kappa for child-child content was 0.77 (see Blatchford et al, 1987, Blatchford in preparation for more details).

Pupil Behaviour Ratings (PBR)

Existing behaviour schedules (e.g., Edelbrock & Achenbach, 1984, McGuire & Richman, 1988, Rutter, 1967) were not satisfactory for our purposes: first, on conceptual grounds, for example, in terms of how different aspects of social and behaviour aspects of school behaviour were defined (see above), second, there were technical concerns, in terms of the structure of the measures and the reliability of sub scales, and, third, because of their length and their appropriateness for the age of children in the Class Size study.

Given the numbers of pupils involved in the project, and the way that teachers have privileged information about students in their class, we decided that a teacher administered procedure would be preferable. Ladd & Profilet (no date) justify the use of teacher reports as the basis for information on peer relations, especially when judgements required are of a more qualitative kind (e.g. how empathetic a child is toward peers). Teachers are likely to be more knowledgeable than observers with regard to such dimensions. We also required an efficient

measure that teachers, given their other commitments to the research project, would not find inconvenient and too time consuming to complete. The PBR was developed at the Institute of Education and was based on other behaviour rating scales (particularly Ladd & Profilet's (undated) Child Behaviour Scale, with additional items taken from Thompson's (1975) Adjustment to School Scale, Rowe's (1995) Behavioural Rating Inventory, the Avon Baseline Assessment (1996), and the Pre-School Behaviour Checklist (McGuire & Richman, 1988).

Teachers completed a PBR for every child in the study at the same time during the middle of the summer term. It comprised over 50 items rated on a three-point scale ('certainly applies to this child', 'applies sometimes to this child', 'does not apply to this child'). Scores on conceptually and empirically linked items that made up a set of factors were added. The factors were: hyperactive/distractible (15 items), aggressive (14 items), anxious/fearful (3 items), pro-social (7 items), asocial (7 items), and excluded (7 items). Cronbach alphas were high: hyperactive/distractible - 0.96, aggressive - 0.91, anxious/fearful -0.82, pro-social - 0.94, asocial - 0.88, and excluded -0.93. Individual items that made up each factor are presented in Appendix 2.

Class sizes

Data were collected on class sizes in two forms: first in terms of the number of children on the school register, and, second, in terms of the number of children actually in the classroom at a given point during a morning session pre-selected by the researchers. This was collected termly and averaged over the year to give measures of 'registered' and 'experienced' class size for each school year. (See Blatchford, Goldstein and Mortimore (1998) for more discussion of issues

involved in measuring class sizes.)

Entry attainments and eligibility for free school meals

It is clearly important to establish that there are no prior differences between children in large and small classes that might affect results from the observation study. The relationship between class size and background factors such as income level and attainment level is not clear-cut in the U.K. but in order to check if there were prior differences between large and small classes, two sources of data were used:

- i . School entry attainment: Information was collected when the pupil entered school by means of a baseline entry assessment conducted by the teacher. The procedure was the Avon Reception Entry Assessment (1996), which covers literacy and mathematics and comprises information from teacher ratings, based on classroom observations, and tasks completed by children. A measure of literacy knowledge was derived by adding for each child scores on 15 items in language, 18 in reading, 17 in writing and a test of letter identification (how many of 26 letters were recognised in terms of either name or sound), and a measure of mathematics was based on total correct out of 19 items. Training was provided for class teachers in its use.
- ii. Information on free school meal entitlement was collected for each child (as a measure of low family income).

RESULTS

Differences between children in large and small classes

In order to ensure that there were no existing differences between children in large and small classes, that might affect interpretation of observation results, differences between classes in terms of 1. school entry assessments in literacy and mathematics, and 2. eligibility for free school meals (the percentage in a class) were analysed with ANOVA. There were no differences between classes on these two measures, indicating that children did not differ on entry to small and large classes in terms of attainment or poverty/income levels.

1. The Systematic observation results

Total scores for the three 'social mode' categories, i.e., teacher-child, child-child and not interacting, were calculated for each child by adding each of the teacher to child 'content' categories (and the child to teacher 'content' categories, which are almost but not exactly the same, see below), the child-child categories, and the not interacting categories. These total scores therefore give a broad picture of how children's time was distributed between the three modes. Mean differences (i.e., the average number of 10 second observations per child) between large and small classes are shown in Table 1.

Table 1 here

It can be seen that children in small classes were more often observed interacting with their teachers than were children in large classes. The teacher to child, and child to teacher, totals

can differ slightly, e.g., a child might initiate a contact in a time interval but the teacher has not yet or does not respond to it. Just taking the teacher to child measures, in a small class children were observed on average 213 times with their teacher, as compared to 144 times in a large class. Conversely, Table 1 shows that children in large classes are more likely to interact with other children (average of 54 v 76 observations per child) and be on their own (131 v 154 observations).

Table 2 here

We now look more closely at the categories describing interactions with other children (see Table 2). About 60% of the child-child contacts are classified as task - i.e., concerned with allocated work - and there were more of these in large classes. This proportion is in line with the greater amount of child-child contacts overall in large classes. However there were also more off task behaviours with peers, i.e. more 'mucking about' (more than twice as much in large classes), and this seems to reflect more than just more time overall with other children. Apart from task related behaviours, the most frequent category of child-child contact is social behaviours - more than 20% of child-child interactions. There were significantly more social interactions in large classes. There were no differences between class sizes in the amount of interactions involving procedural matters. There were very few coded instances of aggression and help between children. So, in summary, there are more contacts overall between children in large classes, involving task, social and off task behaviours.

Total off-task behaviour

We can add up all the off task behaviours in the three social modes to give a total off-task score for each child (i.e., the total of child to teacher inappropriate and off task, child to child mucking about and aggressive, and not interacting off task active and off task passive - see Table 3). Social activities (e.g., talking about television programmes, someone's appearance) are in a sense off-task but are excluded for the purpose of this analysis because they were by definition not deemed to be unacceptable to the teacher, and therefore not deliberately off task in the same way as the off-task categories. It is common for work related behaviour to be accompanied by social talk. A more precise term for 'off task' might be something like 'task avoidant', though we retain the more common usage here.

Table 3 here

It can be seen in Table 3 that there is twice as much off task behaviour overall in large classes in comparison to small classes (42 v 21 observations). The most frequent forms of off task behaviour are not attending to the teacher and not attending to their work when on their own.

2. Class size and the PBR Factors

Correlations were calculated between mean class size over the reception year and total scores on the six PBR factors. This was done with the class and also for the individual child as the unit of analysis. Results are shown in Table 4 for the child level analyses

Table 4 here

Class size differences are weakly though significantly related to the six factors. Perhaps most consistent are relations with the aggressive, asocial, and excluded factors, but in an unexpected way. Although not strong, there is a tendency across all three years for children in larger classes to be rated as less aggressive, asocial, and less excluded, or, to turn this on its head, for children in smaller classes to be rated as more aggressive, asocial, and more excluded. The results concerning the prosocial factor were not clear. Only in the reception year is there some evidence that children in smaller classes are more prosocial.

These results on aggression, asocial and excluded were puzzling and the relationship between these PBR factors and class size was explored further in terms of class size as a categorical variable, divided into bands of 20 or less, 21-25, 26-30, and 31 plus pupils (see Mortimore & Blatchford, 1993). This approach can be helpful in detecting relationships between PBR scores and particular parts of the class size distribution. Results were calculated separately for Reception, Y1 and Y2, for Cohort 1 and are shown in Table 5.

Table 5 here

In line with the correlational results there were significant differences between the four class size bands and Aggressive, Asocial and Excluded scores at reception and between class size and Asocial and Excluded scores at Y1. Examination of mean scores at reception level indicates a tendency for children in small classes of 20 or less to be MORE inclined to be rated as aggressive, asocial and excluded by their peers. This was supported by post hoc tests (in each case Tukey's HSD indicated significant differences between the smallest class size

band and the other three bands). There was a similar pattern for Y1 for asocial and excluded. Connections between class size and Aggressive at Y1 were in the expected direction, with higher scores in the two smaller class size categories (20 or less and 21-25), but differences between the four groups were not statistically significant. Results for Y2 were not so clear and this may have been affected by there being few small classes under 20; however, there was still no sign of more aggressive, asocial or excluded behaviour in large classes – if anything there was less in the largest classes of 30 or more children.

It needs to be stressed that these results, even when statistically significant, are not strong (and results involving scales at the school class level are not as clear); nevertheless they are consistent in indicating that children in the smallest classes may have the most difficulties with their peers, and that there is no evidence that classroom peer related behaviour, in terms of aggressive, asocial and excluded behaviours, is worse in larger classes.

Attentiveness in class

We have examined relations between class size and attentiveness or on/off task behaviour, on the basis of systematic observations in classrooms; here we look at the associations between the PBR attentiveness (hyperactive /distractible) factor and class size.

The association was not strong, as can be seen in Table 4. For the child level data, there was no clear association at reception, but there were significant but weak relationships at Y1 (for class size present) and Y2 (for both class size registered and class size present). As expected the association was positive; children in larger classes tend to be more distractible. There was

no clear association with the class level data.

Finally, associations between class size and the Anxious/Fearful Factor were not significant for reception and Y1; in Y2 there was a negative relationship, indicating again that there was more anxious/fearful behaviour detected as class sizes became smaller.

DISCUSSION

The overall conclusions from this study are that:

- results from systematic observations showed that children in large classes are more likely to be off task, particularly in terms of not attending to the teacher and not attending to their work when on their own.
- results from the systematic observation study showed that children in large classes are more likely to interact with their peers (and be on their own), and interact less with the teacher. Children in larger classes engage in more task-related contacts, more social interactions and also more off task behaviours, in the form of 'mucking about'.
- associations between class size and factors measured in the PBR (distractible, asocial, excluded, anxious/fearful, aggressive behaviour, pro-social behaviour, aggression, asocial) were not strong, but there was a slight though consistent tendency for worse peer relations, in terms of aggression, asocial and excluded, in the smallest classes.

The results indicate the value of using systematic observation techniques. In contrast to other

forms of data collection it produces data on the basis of careful recording of on-going behaviour (rather than, say, ratings or judgements). Criticisms of systematic observation have usually centred on validity issues (e.g. Delamont & Hamilton, 1986), but it can be useful research tool when answering specific research questions where data are needed on relatively easily observed, high frequency behaviours (Croll, 1986, McIntyre & Macleod, 1986).

The present study also supports the value of developing an instrument like the PBR in allowing distinctions between, and separate measurement of, similar but distinct forms of social functioning. The value in separating distractible/inattentive (externalising) behaviour from aggressive behaviour and from distractible anxious/fearful (internalising) behaviour is to a degree validated because they had different relationships with class size.

Attentiveness and off task behaviour

Results from the observation study therefore showed that children in large classes were more likely to be off task. They were less likely to attend to the teacher and to be off task in contacts with her, more likely to be actively off task with other children, and more likely to be off task when on their own, especially in the passive form of being disengaged from allocated work. Results from the PBR were less clear, though there were weak but significant relationships between class size and distractibility. There is then some confirmation of the expectation that children in large classes will be more distracted from work and more often off task.

So just as children in smaller reception classes seem to perform better academically

(Blatchford, Goldstein, Martin & Browne, submitted), they are also less likely to be off task. In separate analyses, and in line with previous research (e.g., Rowe, 1995), we have also found that there are strong connections between distractibility as measured in the PBR and academic attainment and progress. However, it would be too early to say that it is lack of concentration in class that mediates the class size effect. In future work we will examine the extent to which attentiveness, and other classroom processes such as teaching time, seem to mediate class sizes effects on adjusted end of year scores.

As described in the Introduction the observation and PBR data covered allied but different aspects of peer relations and attentiveness in class. That the observation measures seem more clearly related to size of class than the PBR data is perhaps not surprising. The observation measure deals with moment-by-moment behaviour in classrooms, while the PBR is a retrospective rating by the teacher, and is therefore not so likely to be sensitive to immediate contextual influences. The PBR Hyperactive/distractible factor certainly involves items that reflect a lack of concentration or attention but is likely to reflect a relatively stable and perhaps more endogenous, within-child description. For this reason this measure may be especially useful not so much as an outcome of class size differences but as a factor to be controlled for when considering class size effects on educational progress, for example, as a class 'compositional' variable in the form of the percentage of children in the class with difficulties.

There may appear to be something of a conflict between the observation and PBR results, in the sense that the PBR results suggest that negative peer relations, for example, in the form of

aggressiveness are more likely in small classes, but the observation results show off task behaviour to be more likely in large classes. However, the measures are not really tapping the same thing. We have seen that most off task behaviour in the observation study involves not attending to the teacher or work. In the case of peer interactions of task behaviour is mostly 'mucking about' which is not the same as aggressiveness. In fact, aggression between children is very rare.

Class size and peer relations

We have seen that the most consistent results from the analysis of relationships between class size and the PBR factors was for children in the smallest classes to be more likely to be rated as aggressive, asocial and rejected. How do we explain these seemingly odd findings from the PBR?

There are two main possibilities. The first explanation is in terms of the effect of class size on teachers' perception of children in their class. One possibility is that teachers have a clearer and more visible picture of children in smaller classes. There is perhaps a tendency for children to be more salient. As one of the research team put it: 'they're all normal until you get to know them.' Some support for this explanation comes from case studies and end of year questionnaires carried out as part of the wider Class Size Study. With fewer children a teacher can get know her children better (Blatchford, Moriarty, Edmonds & Martin, in press), and this would allow her to be more aware of the difficulties some children might have in relating to others.

It is not possible to exactly test this explanation, which in a sense relates to the validity of the PBR, though it is unlikely to fully account for the findings. It is known that the PBR ratings do correlate reasonably well with judgements of external researchers, peer nominations and observational data on the same dimensions (Blatchford, Baines & Pellegrini, submitted), which indicates a fair degree of validity for the PBR. Ladd & Profilet (no date) also show high validity for their teacher-administered Child Behaviour Scale, which is similar to the PBR. Moreover, if the experience of a smaller class increases the likelihood of a feel-good factor, with teachers less stressed (Moriarty, Edmonds, Blatchford & Martin, 2001), we might expect this to affect their judgements of children in a positive at least as much as a negative direction.

The second possible explanation is that the associations are saying something real about social relations in small and large classes, i.e., rather than something to do with teacher's perceptions. But if this is true why might children in smaller classes show more of a tendency toward less social and more aggressive behaviour toward their peers? One possible explanation is found in the observation results which as we have seen showed that children in larger classes spend more time with each other, interacting about work, socially as well as 'mucking about'. Conversely, in smaller classes children interact more with their teachers (and this includes more social contacts with their teacher.) The case studies have indicated that in small classes, especially very small ones under 20, children can come to rely on the teacher, and look to her for direction, while in a larger class the children may be more likely to develop a degree of independence from the teacher, and a working and social relationship with each other. Certainly, some teachers felt that socially and academically there could be

too few children in a class and it could mean that if children fell out their social relations could suffer, and this might give teachers the impression that they are excluded or asocial. Using a family size analogy, it may be that in a small class the children can become over dependent on the teacher, while in a larger class children (analogous to siblings) may have to rely more on each other. In one school with a small class the teacher, like others, no matter what the size of class, encouraged children to learn from each other, but it was also noticeable during observations that one rather immature boy looked to her for a lot of attention, which she (albeit sometimes reluctantly) gave. In a larger class she would simply not have had the time for such attention, and the boy would have been forced to look elsewhere for help. Whether this feature of small classes outweighs the academic benefits is debatable, but does suggest one potential difficulty with small classes, that teachers would need to guard against, and one way in which large classes may have unexpected consequences.

This second explanation remains speculative at the moment but is interesting in the light of the accepted wisdom in much of the literature of generally positive effects. On the evidence so far from the Class Size Study, small classes may be good academically for young children (Blatchford, Goldstein, Martin & Brown, submitted), but not necessarily socially.

If one starts from the assumption that teacher child contacts are likely to be the most conducive social context for learning and achievement then the situation in large classes is worrying. However, one should not quickly dismiss the view that task related contacts with peers are unimportant. Although we have seen that children engaged in more off task behaviours, at the same time they engaged in more on task related behaviours with their

peers. This can be seen in positive and negative terms. If children, by being less able to get a teacher's attention, then turn their attentions to their peers then this may be a distracting influence and not productive. On the other hand using peers as sources of information may actually be a valuable context for learning. Much will depend on the quality of interactions between peers, which were not examined in the present study. Descriptive research has shown that the level of talk between peers can be low level and unchallenging (Bennett, Desforges, Cockburn & Wilkinson, 1985), even though in terms of definitions used in this study they would still have been classified as task related. A number of authors are now recognising the potential of peer interactive contexts in relation to achievement and motivation (O'Donnell & King, 1999), and this in turn suggests that one type of strategy teachers could make when faced with larger classes is to make more deliberate use of peer interactive contexts. This will require helping pupils to work productively together, e.g. in terms of gaining trust and confidence in each other, listening to each other, and giving and receiving explanations (Webb & Falivar, 1999), as well as attention to features of within class groupings (Blatchford, Baines, Kutnick and Martin, 2001, Kutnick, Blatchford & Baines, in press).

APPENDIX 1

Systematic Observation Categories

Observation categories and brief definitions and examples are as follows:

(A) The Social Modes

(1) Teacher-Child Contact

(a) *Social setting: one-to-one, group or whole class.*

(b) *Child role: focus (target child is focus of teacher's attention) or audience (another*

child is focus in group or class involving target child, or teacher interacts to same extent with all children). These two sets of categories described the behavior coded in the 'teacher content' section.

(c) *Teacher content: task-teach*: contacts directly concerned with the substantive content of children's task activities, i.e. communicating concepts, facts or ideas by explaining, informing, demonstrating, questioning, suggesting ('task' here includes any activity in settings, other than transition times). *Task-preparation*: contacts directly concerning the organization and preparation of children's task activities and not their substantive content. *Task-silent*: a teacher's contribution to task contact is passive, e.g. hearing child read, looking over child's work. *Procedure*: contacts concerned with classroom management and organization of classroom routine, often at transition times, e.g. milk, washing, changing, organizing materials. *Social*: personal or social comments, e.g. about life outside the classroom, children's appearance, health, etc. *Unclear*: not possible to code reliably.

(2) Child-Teacher

(a) *Child contribution*: codes child's contribution to interaction with teacher in terms of *respond* to teacher, *initiate* contact with teacher, *attend* to teacher, *continued* interaction from previous time intervals and *unclear*. These categories describe the child's contribution to the behavior coded in the 'child content' section. If the child interacted in an overt way ('respond', 'initiate', 'continued'), these were coded; only when the child attended for the whole ten-second interval was 'attend' coded. Because of its likely low frequency of occurrence, 'initiate' was given priority over 'respond' if both occurred

within the same interval. Predominant activity sampling therefore (see below) was not used for the ‘child contribution’ categories.

(b) *Child content: task*: all child behaviors in contact with teacher that are concerned with ‘task’ as defined for ‘teacher content’, above. *Procedure*: equivalent to teacher ‘procedure’, above. *Social*: equivalent to teacher ‘social’, above. *Inappropriate*: child behavior to teacher obviously unrelated to teacher request or situation, e.g. not answering a question on maths, but making a comment about a television program the previous evening. *Off-task*: child behavior involving the teacher, but not directed at her, that is, inappropriate or unrelated to situation (e.g. not attending to story). *Unclear*.

(B) Child-Child

Coded when child is in contact with other children but not teacher. *Task*: all contacts with other children that are concerned with the content of ‘tasks’ as defined for ‘teacher content’, above. *Procedure*: all contacts with other children concerning classroom organization and routine. *Social*: social or personal contacts not related to work or procedure. *Mucking about*: contacts that involve fooling around. Like social contacts, they are not about task or procedural activities, but are more obviously off-task. *Aggressive*: target child is aggressive (verbally or physically) towards other child(ren). *Help*: target child helps another child, e.g. helps tie her shoelaces. *Unclear*: behavior with other children that cannot be coded reliably, as above.

(C) Not Interacting

Coded during time intervals child is not in contact with teacher or other children. *Task-involved*: target child is involved in own ‘task’ activity (as defined for ‘teacher content’,

above). *Procedure*: activity concerned with procedure or routine. *Off-task (active)*: target child focuses on something other than task in hand. *Off-task (passive)*: target child is disengaged during task activity, e.g. wandering around or daydreaming. *Audience*: target child observes other children or teacher when not in contact with them. *Unclear*: behavior when not interacting that cannot be reliably coded, as above.

APPENDIX 2

Pupil Behaviour Rating (PBR) Scale

Aggressive (with peers) (14 items):

- Aggressive child
- Bullies other children
- Threatens other children
- Taunts and teases other children
- Fights with other children
- Kicks, bites, hits
- Difficult to manage or control; defiant
- Irritable
- Argues with peers
- Destroys own or others' belongings
- Disrupts peers' activities
- Is disobedient
- Bossy towards peers

Restless

Hyperactive-Distractible/ Purposeful-Attentive (15 items)

Perseveres

concentrates

persistent, sustained attention span

poor concentration

purposeful

likes to work things out for self

inattentive

behaves appropriately (less structured)

not much difficulty understanding instructions

squirmy

independently selects and returns equipment

moves to new activity on completion of a task

coherent

behaves appropriately (classroom routines)

coping well with school, not a cause for concern

Anxious-Fearful (4 items)

Is worried

Fearful or afraid

Appears miserable, distressed.

cries easily

Peer relations

Asocial with peers (6 items)

Likes to be alone

Solitary child

Keeps peers at a distance

Prefers to play alone

Avoids peers

Withdraws from peer activities

Excluded by peers (7 items)

Peers refuse to let child play

Peers avoid this child

Is ignored by peers

Excluded from peers activities

Not chosen as playmate by peers

Ridiculed by peers

Not much liked

Prosocial with peers (7 items)

Concerned when other children are distressed

Recognises feelings of others; is empathetic

Offers help or comfort when other children are upset

Kind towards peers

Helps other children

Shows concern for moral issues

Co-operative with peers

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Table 1

Systematic observations of large and small classes: mean differences in

The Social Modes

1	<u>Teacher-Child</u>	<u>Mean (sd)</u>		<u>F (df) significance</u>
		<u>Small (n=122)</u>	<u>Large (n=112)</u>	
	a) Teacher to Child	212.95 (104.37)	143.93 (56.89)	38.47 (1,232), p<0.001
	b) Child to Teacher	215.25 (103.77)	148.01 (58.16)	36.50 (1,232), p<0.001
2	<u>Child-Child</u>	53.96 (41.15)	76.36 (48.38)	14.64 (1,232), p<0.001
3	<u>Not Interacting</u>	130.80 (73.30)	154.10 (65.07)	6.56 (1,232), p<0.05

Note: n= number of children

Table 2

Systematic observations of small and large classes:
Mean differences in Child-Child Interactions

	Mean (s.d.)		F	P	Percentage of Sub Set
	Small (n=122)	Large (n=112)			
<u>Task</u>	34.02 (29.28)	45.49 (36.43)	7.10	p<0.01	57.6
<u>Procedure</u>	7.21 (8.41)	6.47 (7.58)	n.s.	n.s.	11.1
<u>Social</u>	9.42 (11.57)	15.22 (14.27)	11.76	p=0.001	21.8
<u>Mucking About</u>	2.13 (3.74)	5.39 (7.70)	17.41	p<0.001	5.4
<u>Aggressive</u>	0.10 (0.39)	0.19 (0.99)	n.s.	n.s.	
<u>Help</u>	0.20 (0.75)	0.80 (2.32)	7.53	p<0.01	0.9
<u>Unclear</u>	0.89 (1.87)	2.79 (5.15)	14.70	p<0.001	3.1
<u>Total</u>	53.96 (41.15)	76.36 (48.38)	14.64	p<0.001	

Table 3

Systematic observation of small and large classes: mean differences in Child 'off-task' Behaviours

	<u>Small</u>	<u>Large</u>	<u>F</u>	<u>P</u>	<u>Overall off-task Behaviours</u>
<u>Child/Teacher</u>					
Inappropriate	0.94 (2.66)	1.44 (4.25)	n.s.	n.s.	4%
Off-Task	10.28 (17.23)	15.01 (20.03)	3.77	p=0.05	41%
<u>Child/Child</u>					
Mucking About	2.13 (3.74)	5.39 (7.70)	17.41	p<0.001	12%
Aggressive	0.10 (0.39)	0.19 (0.99)	n.s.	n.s.	-
<u>Not Interacting</u>					
Off-Task (Active)	2.98 (6.54)	6.42 (9.19)	11.04	p=0.001	15%
Off-Task (Passive)	4.44 (6.71)	13.07 (13.93)	37.41	p<0.001	28%
<u>Total</u>	20.87 (25.00)	41.52 (36.01)	26.32	p<0.001	100%

Table 4
Pupil Behaviour Rating Factors and Class Size (Correlation Coefficients) (Child Level)

		Reception		Year 1		Year 2	
		Class Size Registered	Class Size Present	Class Size Registered	Class Size Present	Class Size Registered	Class Size Present
<u>Aggressive</u>	<u>C</u>	-.028 *	-.009	-.037*	-.024	-.127 ***	-.117***
	<u>Sig</u>	.046	.533	.016	.119	.000	.000
	<u>N</u>	5120	4607	4321	4321	2854	2854
<u>In-Attentiveness</u>	<u>C</u>	-.006	.015	.020	.052 *	.044 *	.070 ***
	<u>Sig</u>	.655	.300	.183	.001	.017	.000
	<u>N</u>	5119	4606	4321	4321	2854	2854
<u>Asocial</u>	<u>C</u>	-.044 **	-.066 ***	.029	-.039 **	-.034	-.051 **
	<u>Sig</u>	.002	.000	.060	.011	.070	.006
	<u>N</u>	5118	4605	4320	4320	2854	2854
<u>Prosocial</u>	<u>C</u>	-.040 **	-.038 **	-.015	.009	.037*	.004
	<u>Sig</u>	.004	.010	.336	.551	.050	.845
	<u>N</u>	5118	4605	4318	4318	2854	2854
<u>Excluded</u>	<u>C</u>	-.054 ***	-.059***	-.019	-.016	-.055 **	-.045 *
	<u>Sig</u>	.000	.000	.203	.308	.003	.017
	<u>N</u>	5119	4606	4318	4318	2854	2854
<u>Anxious/ Fearful</u>	<u>C</u>	-.003	-.016	.006	-.011	-.074 ***	-.114***
	<u>Sig</u>	.815	.276	.689	.473	.000	.000
	<u>N</u>	5118	4605	4318	4318	2854	2854

Class size, pupil attentiveness and peer relations

Table 5 - Pupil Behaviour Ratings Factors Scores x Registered Class Size

<u>Reception</u>		<u>Aggressive</u>			<u>Asocial</u>			<u>Excluded by Peers</u>			
<u>Class Size</u>	Mean	SD	N	Mean	SD	N	Mean	SD	N		
20 or less	4.38	6.85	458	1.70	3.03	458	1.71	3.37	458		
21 to 25	3.41	5.40	1153	1.15	2.27	1153	1.08	2.42	1153		
26 to 30	3.26	5.66	2502	1.23	2.49	2501	1.22	2.76	2502		
31+	2.98	4.98	1052	1.20	2.12	1052	.94	2.08	1052		
			F(3,5161) 6.99 p<.001				F(3,5160) 6.10 p<.001				F(3,5161) 10.07 p<.001
<u>Year 1</u>		<u>Aggressive</u>			<u>Asocial</u>			<u>Excluded by Peers</u>			
<u>Class Size</u>	Mean	SD	N	Mean	SD	N	Mean	SD	N		
20 or less	3.5	6.4	257	1.2	2.5	257	1.3	3.0	256		
21 to 25	3.4	5.2	846	.69	1.6	846	1.0	2.1	846		
26 to 30	3.0	5.1	2313	.78	1.9	2312	.99	2.2	2311		
31+	3.1	5.2	859	.89	1.9	859	1.2	2.4	859		
			Not Significant				F(3,4270) 5.979 p<.001				F(3,4268)2.8 p<.05
<u>Year 2</u>		<u>Aggressive</u>			<u>Asocial</u>			<u>Excluded by Peers</u>			
<u>Class Size</u>	Mean	SD	N	Mean	SD	N	Mean	SD	N		
20 or less	2.19	2.85	31	.26	.44	31	1.00	1.97	31		
21 to 25	3.60	5.42	690	.79	1.67	690	1.13	2.31	690		
26 to 30	2.69	4.68	1334	.78	1.67	1334	1.07	2.37	1334		
31+	2.04	4.25	799	.56	1.65	799	.83	2.08	799		
			F(3, 2850) 13.416, p<.001				F(3, 2850) 4.088,p<.01				Not Significant

