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Academic outcomes in school classes with markedly disruptive pupils

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Abstract The aim of the present research is to investigate the degree to which average academic outcomes in secondary school classes are associated with the inclusion of markedly disruptive pupils. Findings are based on two separate studies among pupils in Norwegian secondary schools. The first study included a relatively large sample of 2,332 pupils from 105 school classes and used pupil report of disruptive behaviour, perceived peace to learn and grades achieved. A second study, conducted among a smaller sample of 496 pupils from 21 school classes, included teacher reports of pupil behaviour and grades achieved, as well as scores from tests in two school subjects. Results indicate that a relatively large percentage of Norwegian secondary pupils want less classroom disruption. Pupils in classes with markedly disruptive pupils reported significantly less opportunity to learn in peace. However, the percentage of between class variance in perceived peace to learn was relatively low, indicating that lack of peace to learn is a general problem in Norwegian classrooms, irrespective of whether there are markedly disruptive individuals in the class. Finally, academic outcomes were not found to be significantly lower among pupils in classes with markedly disruptive pupils.

Keywords Academic outcomes · Classroom disruption · Disruptive behaviour · Peace to learn

1 Introduction

In the PISA studies of 2000 and 2003, which compared Norway with the other OECD-countries, Norwegian school pupils were identified as being among those with

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the poorest discipline (Kjærnsli et al. 2004; Lie et al. 2001). Results from the study conducted in 2000 indicated that about one in four Norwegian pupils had serious problems concentrating because of noisy and disruptive classroom atmospheres. Although Norwegian schools seem to have some of the most serious problems in this respect, similar situations are reported in other Western countries. It is estimated that 5–10% of Norwegian pupils, 3–6% of pupils in the United States, and, about 5% of pupils in Great Britain display markedly disruptive behaviour (Cole et al. 2003; Kauffman 2001; Sørlie 2000). According to Rosenberg and Jackman (2003) pupil behaviour has become one of the biggest issues in the public school system in United States. Pupils' lack of respect and disregard for their peers and teachers alike, as well as the amount of time spent on discipline rather than learning, has become a common concern expressed by teachers. Classroom disruption is a major concern for schools. It can threaten the well-being of pupils and reduce learning outcomes because pupils have difficulties concentrating on the learning tasks or simply because of the loss of learning time. In a study conducted in the United States (Scates 2005), 56% of the teachers reported normally losing 25 min of a 90-min block, which if converted into days in a school year represents approximately 50 school days being lost because of disruption. The PISA-results for Norway are in accordance with the assumption that disruptive behaviour in schools has negative effects on learning outcomes. Despite good funding for schools compared to most other countries, achievement scores for Norwegian school pupils are below average in mathematics and science. Those schools which did perform well, were found to have fewer problems with the learning environment than schools which have low performances (Kjærnsli et al. 2004).

Another negative consequence of disruptive behaviour among pupils is that it may significantly reduce teachers' job satisfaction. Managing pupils' behaviour is considered one of the most important activities in a teacher's role, and perceived failure in this area may reduce a teacher's perceived self-efficacy (Langdon 1996). Previous research indicates that pupil misbehaviour is one of the most important job stressors for teachers, and it is conceivable that teachers who are more idealistic, and who have high expectations for pupil learning are most prone to experience this type of stress. This may in turn lead to burnout and intentions to leave the profession (Friedman 1995; Kokkinos 2007; Pines 1982). In this way, high levels of misbehaviour among pupils may actually cause the teachers with the greatest potential to leave the profession (Dworkin 1987; Public Agenda 2004).

These perceived problems with noisy and disruptive classrooms may be the result of several factors. Societal factors, such as educational demands on the population and the economic situation, may be central precursors of motivational and discipline problems in school. In late modern societies, a well-educated population is considered crucial for economic growth and social integration. The need for a high level of competence in the population has resulted in young people's spending more years at school, and, in the curriculum in compulsory schools, becoming more theoretical. For less academic pupils and for those who prefer practical subjects, it may have become more difficult to find schoolwork appealing or to understand the future relevance of schoolwork (Birkemo 2000). Perceptions of schoolwork as meaningless may lead to disruptive behaviour (Bru 2006). This could be an especially critical factor in a nation with a blooming economy, such as Norway, where it is relatively

easy for young people to get well-paid jobs without particularly high achievement at school.

How teachers relate to pupils or organize and manage the learning situation will also influence pupils' behaviour in the classroom. Good relationships with teachers can promote positive behaviour and inhibit the negative. Findings from several studies indicate that pupils who feel emotionally supported by their teachers are more likely to display higher levels of on-task behaviour and lower levels of disruptive behaviour (Bru 2006; Fraser and Fisher 1982; Hamre and Pianta 2001). Previous research also suggests that the establishment of clear rules for classroom behaviour and careful monitoring of pupils' schoolwork could be crucial in preventing disruptive behaviour (Barber and Olsen 2004; Doyle and Carter 1987; Levin and Nolan 1996; Mortimore et al. 1988). In more recent years, there has been an increased focus on support for pupil autonomy and pupil participation. There is research which suggests that pupils who are given an appropriate amount of autonomy, display increased engagement and spend more time on task (Reeve 2002; Reeve et al. 2004). However, structuring the learning environment to support pupil autonomy, helping pupils use time effectively, allowing them to choose appropriate learning materials and enabling them to acquire knowledge or skills central to the subject is a demanding task. In their interpretation of the PISA-2003 results, Kjærnsli et al. (2004) argue that Norwegian schools have given pupils too much responsibility for their own learning to the extent that they are not capable of handling it. They also assert that there is a need to restore the Norwegian teacher as an authoritative leader to avoid the learning environment being dominated by pupils who do not necessarily have learning as their primary source of motivation.

In Norway, it is normal policy to include almost all pupils, including those with emotional and behavioural difficulties, in mainstream classes. The last few decades have witnessed the dismantling of the vast majority of special schools. Today, the notion of a 'common school for all' with the majority of pupils who are designated as having special educational needs attending mainstream schools is the pedagogical norm (Flem and Keller 2000). It is estimated that 99.5% of Norwegian pupils are included in mainstream classes (Norges offentlige utredninger 2003). This policy of inclusion is in line with the Salamanca declaration (UNESCO 1994) promoting the inclusion of all pupils into regular school, and, is supported by recent research which suggests that strategies for preventing and/or reducing the incidence of pupil misbehaviour may work well in a mainstream setting (Short and Shapiro 1993). Research also indicates that the early labelling of children with challenging behaviour as 'deviant' as well as rejection by peers and teachers are risk factors for developing an antisocial behaviour pattern that may lead to criminality (Dodge 1993; Patterson et al. 1992; Walker et al. 1995). The placement of pupils in special classes or schools can have a very negative effect. Whereas the inclusion of challenging pupils in mainstream school classes may prevent the further development of antisocial behaviour patterns.

That said, the inclusion of pupils with behavioural problems might explain why many Norwegian teachers claim that pupil misbehaviour has increased during the last few decades. In a survey in the United States (Public Agenda 2004), 70% of school pupils said that unruly pupils distract them and disrupt classes and 53% believed they would learn more if the disruptive pupils were removed from the classroom. Disruptive pupils may affect other pupils in several ways. The most obvious is that they contribute

to a noisy learning environment, making it difficult for other pupils to concentrate on learning tasks. It is also possible that they convey attitudes to other pupils which may be counterproductive to high academic achievement. This may be particularly likely if the disruptive pupil or pupils are perceived to have a high social position in the peer group. The pursuit of social goals is an integral part of classroom life. Within that context, the search for peer approval is probably important for most, if not all, pupils (Berndt and Keefe 1996). Wenzel (1989) found that adolescents were more concerned with social than learning goals. It is not, therefore, surprising that peer attitudes towards learning affect how much effort pupils spend on schoolwork (see, e.g., Berndt and Keefe 1996; Willis 1978). A third possibility is that teachers are forced to spend a lot of time and energy managing the behaviour of disruptive pupils and this reduces the quality of teaching and the time left to support other pupils.

There is a small body of research which has addressed how the inclusion of pupils with special educational needs impacts on the academic outcomes of fellow pupils. These studies have generally shown no or modest negative impact (Farrell et al. 2007; Kalambouka et al. 2005). However these studies have not specifically focused on the inclusion of disruptive pupils, and, surprisingly, the question of whether disruptive children influence peer learning and behaviour in school has gone unstudied (Figlio 2005). The aim of this study is to try to fill some of this gap in research by examining academic outcomes among pupils in school classes with and without markedly disruptive pupils.

2 Method

Two studies were implemented to investigate the relationship between disruptive behaviour and academic outcomes. The first study had the advantage of a large sample including a high number of school classes. This made it possible to implement multi level modelling. This study was based on pupil self report of behaviour and academic outcomes. The second study allowed the use of teacher reports as a basis for identifying markedly disruptive pupils. Teachers also reported on pupils' grades in three subjects, and, it was possible to include pupils' results from tests in English and mathematics as measures of academic outcomes.

2.1 Study 1

2.1.1 Sample

The first study was based on a survey of a sample of 2,352 pupils from 105 school classes in 12 secondary schools which were participating in a nationwide anti-bullying programme. These 12 schools were selected randomly from a total of 26 secondary schools participating in the programme. The anti-bullying programme had a whole school approach and data were collected from all school classes in the 12 schools. This study used a survey conducted before the anti-bullying intervention started. The data were collected in 2003. Twenty pupils had more than one item missing on one or more of the scales included and were excluded from the study. The overall response after the

exclusion of these was 92%, ranging from 68 to 100% in the different school classes. Pupils were in the 8th to 10th grade of school (13–15 year-olds). The pupils were asked to complete a questionnaire during an ordinary 45-min classroom lesson with a teacher present. In order to ensure optimal completion of the questionnaire (including returns from pupils who might have reading or language difficulties), teachers read out each question aloud. In order to avoid pupils' influencing each other, the questionnaires were administered, as far as possible, at the same time in each class in each school.

2.1.2 Measures

In study one, self-reports of grades were used as indicators of *academic outcomes*. Pupils reported the grades they had received at the end of the autumn term in written Norwegian, written English and mathematics. An index score was computed on the basis of grades in the three subjects and the scores for grades yielded a Cronbach's α of 0.81. The lack of opportunity to concentrate on learning in a peaceful and uninterrupted environment' which will be referred to as *Perceived Lack of Peace to Learn* was assessed by a scale including three items. This scale had a Cronbach's α of 0.81 (See Table 1 below for the wording of items and response alternatives.). Assessment of *Disruptive Behaviour* was conducted using a scale including four items and had a Cronbach's α of 0.82 (See Table 2 below for the wording of items and response alternatives). In addition, scores for gender, year of schooling, number of pupils and response rate for the individual school classes were entered as covariates.

A factor analysis including items on Disruptive Behaviour and Perceived Lack of Peace to Learn implementing principal axis factoring, an eigenvalue of 1 and oblique rotation, differentiated items into two factors in the anticipated way. The factor for Disruptive Behaviour accounted for 34.8% of the total variance in items, and item loadings for this factor ranged from 0.63 to 0.80. The factor for Perceived Lack of Peace to Learn accounted for 21.2% of the total variance in items and factor loading ranged from 0.74 to 0.81. The correlation coefficient between scores for the two scales was $-0.19 (p < 0.001)$. Results indicate that items on Disruptive Behaviour and Lack

Table 1 Distribution of responses to items on perceived lack of peace to learn (study one, $N = 2{,}332$)

	Disagree strongly (%)	Disagree somewhat (%)	Agree somewhat (%)	Agree strongly (%)
I would have learned more if there had been more order in class.	11.0	27.6	34.8	26.7
I wish there was less disorderly behaviour in class.	14.0	32.0	34.3	19.6
I cannot concentrate on the subject we are learning because other pupils are too disorderly.	21.6	39.3	27.0	12.1

Table 2 Distribution of responses to items for pupils' self report of disruptive behaviour (study one, $N = 2{,}332$)

	Disagree strongly (%)	Disagree somewhat (%)	Agree somewhat (%)	Agree strongly (%)
Speak with other pupils without permission	7.9	14.0	43.2	34.9
Disturb other pupils	25.4	40.4	23.1	11.1
Talk out of turn	22.8	26.8	33.7	16.7
Disturb the teaching	36.3	37.9	17.3	8.5

of Peace to Learn measure two separate constructs, and, that the measurements have relatively high internal consistency.

2.2 Study 2

2.2.1 Sample

The second study was conducted among a sample of 496 secondary school pupils from 21 school classes participating in an intervention study for the improvement of the learning environment. Data were collected in 2006 and the schools were all situated in a city in the south-western part of Norway. The assessment used here was conducted at the end of the spring term before the intervention started. The data collection included teacher reports of the number of pupils in the class, the pupils' behaviour and grades, pupils' report of gender and perceived peace to learn and results from tests in English and mathematics. The response rate for teachers' reports varied between 63 and 100% with an average of 93%. Sixteen of the school classes had a response rate for teachers' reports above 90%. For the subject tests, the rate of participation also varied between 63 and 100% with an average of 86%. For the pupils' report, the response rate varied between 71 and 98% with an average of 89%.

2.2.2 Measures

The second study was included because it was possible to include teachers' assessment of Disruptive Behaviour and teachers' reports of grades and scores from tests in subjects which can be used as measures of academic outcomes. In addition this study made it possible to control for results from subject-tests performed early in the previous autumn term, as well as grades received at the end of the previous autumn term.

Disruptive Behaviour was assessed by the class teachers' response to the item "To what degree has the individual pupil in the spring term disrupted the teaching or the school work of fellow pupils". The item had response alternatives "Not at all", "To a small extent", "To some extent", "To a large extent" and "To a very large extent". In addition, teachers reported the individual pupils' grades in written Norwegian, written English and mathematics.

In the second study, the assessment of academic outcomes also included tests in mathematics and English. The tests were constructed on the basis of national tests in the two subjects and tasks were selected to cover a broad range of relevant topics. An experienced teacher formulated the tests in cooperation with the researchers. The tests in both subjects were formulated as objective tests and were corrected and scored by a research assistant at our research institute. At the time of the tests, pupils were in the 8th and 9th year of school, and, separate tests were constructed for these two different year groups. Scores for the tests represent the percentage of the total score pupils had achieved. The numbers of items for the tests were: English 8th year: 86; English 9th year: 108; Mathematics 8th year: 29; Mathematics 9th year: 45.

Cultural capital, measured by the number of books at home, has been found to account for pupils' academic achievements in general (Grønmo et al. 2004). In the second study, pupils' report of the number of books at home was included as an additional covariate to correct for differences between school classes in social background. This variable showed significant associations ranging from 0.17 to 0.28 with scores for academic outcomes ($p < 0.01$).

2.3 Procedure

Descriptive analyses, reliability testing (Cronbachs' alpha) and analyses of general linear models were conducted using SPSS (Norusis 2007). Multilevel analyses using a maximum likelihood procedure were conducted using Mplus 4 (Muthen 2003). Structural models used observed variables (sum-scores of the items). Goodness of fit was evaluated according to Hu and Bentler's (1999) recommendations. They recommend using a cut-off value of .08 for the standardized root mean squared residual (SRMR) and supplementing it with indices like the Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI) with cut-off values above .95, or the Root Mean Square Error of Approximation (RMSEA) with a cut-off value of about .06 or less.

In study one, pupils with markedly disruptive behaviour were defined as those who had scores equal to or higher than 3.75 on the scale for Disruptive Behaviour, indicating that they agreed strongly to three of the four items on behaviour and agreed to a certain extent to the last item in this scale. With this strategy, 131 pupils or 5.5% of the sample were defined as pupils with marked disruptive behaviour. The number of pupils defined as markedly disruptive were then counted for each school class and classes were classified into three groups: (1) classes with no markedly disruptive pupil (27 school classes), (2) classes with one markedly disruptive pupil (40 school classes), and, (3) classes with more than one markedly disruptive pupil (38 school classes). Of the classes in the third category, 26 classes had two pupils defined as markedly disruptive, eight had three, two had four, and, one had six such pupils (max. 25% in one school class).

In the second study, pupils were categorized as markedly disruptive if the class teacher indicated them to be disruptive to a large or very large extent. Thirty four or 6.8% of the sample fell into this category. As in study one, the number of such pupils within each class was counted. Of the twenty one school classes in the second study,

seven school classes had no pupil categorized as markedly disruptive; five had one such pupil, whereas nine had two or more such pupils (max. 24% in one school class).

The level of missing data was low for the pupils included (below 3%). Missing data was replaced by the individual pupils' mean score for the other items included in the different scales, or with the mean score for the item when it was not part of a scale.

3 Results

Table 1 displays the distribution of pupils' responses to items on Lack of Peace to Learn. From Table 1, it can be seen that about 60% of pupils agreed that they would have learned more if there was more peace to learn at school, and, nearly 40% indicated that noisy classrooms hampered their ability to concentrate on school work. The scale for Lack of Peace to Learn had a scoring range of 1–4, a mean equal to 2.55, and a standard deviation of 0.81.

From Table 2, it can be seen that about four out of five pupils agreed that they speak to other pupils without permission, and about a third of the pupils indicated that they disturb other pupils, whereas about one quarter of the pupils agreed that they disturb the teaching. The scale for Disruptive Behaviour had a scoring range from 1 to 4, a mean of 2.42 and a standard deviation of 0.76.

Mean scores for subject grades in classes with no pupil (27 classes), one pupil (40 classes), and, more than one pupil (38 classes) classified as markedly disruptive are given in Table 3. Differences in mean scores between the three groups were analysed using multivariate and univariate general linear models (GLM). The multivariate approach included grades in Norwegian, English and Mathematics as dependent variables, whereas the overall score across these three subjects was included as a dependent variable in the univariate GLM. In both analyses, gender, year of schooling, number of pupils in class, the class's response rate and a variable indicating whether the individual pupil was classified as markedly disruptive were entered as covariates. The mean scores showed a slight tendency for a lower mean grade score among pupils in classes with more than one pupil classified as markedly disruptive, but these differences in mean grade scores were not statistically significant. The result for the multivariate test was: $F = 1.035$, $p = 0.40$.

Markedly disruptive pupils may have been more inclined not to participate in the study. This could lead to a misclassification of classes. For example, classes with one markedly disruptive pupil who did not participate in the study could wrongly be classified as a class without markedly disruptive pupils. The risk for misclassification would increase with a reduced response rate. Follow up analyses were therefore conducted including only classes with a response rate equal to or above 0.90% to check if such a mechanism could have influenced the results. This approach yielded a very modest increase in the mean difference (0.02 grade points) between the sub sample of pupils in classes with no pupil and the sub sample with more than one pupil classified as markedly disruptive. The result for the multivariate test for the sample with class response rate above 90% was: $F = 0.929$, $p = 0.47$.

Results from an analytic approach including categorization of a continuous variable could be influenced by what cut-off score is chosen. It is also possible that the

Table 3 Mean scores and standard deviations, as well as results from comparisons of mean scores for grades and perceived lack of peace to learn among sub samples of pupils in (**a**) classes with no pupils categorised as showing marked disruptive behaviour, (**b**) classes with one such pupil, and (**c**) classes with more than one such pupil

	None $N = 583$			One $N = 874$			More than one $N = 875$			Comparison of mean scores		
	M	SD	Adjusted M	M	SD	Adjusted M	M	SD	Adjusted M	df	F	p
Lack of peace to learn	2.52	0.77	2.52	2.52	0.82	2.53	2.61	0.83	2.61	2/2,324	2.65	0.071
Subject grades												
Norwegian	4.04	0.93	4.02	3.98	0.87	3.99	3.98	0.90	3.98	2/2,324	0.382	0.683
English	3.92	1.06	3.92	3.95	0.99	3.95	3.87	1.01	3.87	2/2,324	1.488	0.226
Mathematics	3.73	1.16	3.76	3.71	1.07	3.71	3.72	1.02	3.70	2/2,324	0.479	0.620
Overall	3.90	0.91	3.90	3.88	0.83	3.89	3.86	0.82	3.85	2/2,324	0.632	0.531

Scoring ranges: Grades 1–6

Lack of peace to learn 1–4, In comparisons of mean scores gender, year of schooling, number of pupils in class, the class's response rate and a variable indicating if the individual pupil was classified as markedly disruptive were entered as covariates (Study one, $N = 2{,}332$)

Table 4 Results from multilevel regression analyses for associations of disruptive behaviour with perceived lack of peace to learn (study one; pupils $N = 2{,}332$; school classes, $N = 105$)

	Disruptive behaviour		Lack of peace to learn	
	Within	Between	Within	Between
Intra class correlation		0.057		0.071
Independent variable				
Disruptive behaviour	–	–	−0.22**	0.44*
Control variables				
Gender	−0.08**	–	0.04	–
Year of schooling	–	0.37*	–	−0.34*
Class size	–	−0.02	–	0.13
Response rate	–	−0.31*	–	−.19

critical factor for academic achievement is not having one markedly disruptive pupil in the classroom but the total disruption caused by several more moderately disruptive pupils. To look at this possibility a multilevel regression approach was implemented.

Results from the multilevel regression for pupils' reports of Disruptive Behaviour and Perceived Lack of Peace to Learn are given in Table 4. In the models, all parameters within each level were estimated and, according to the criteria proposed by Hu and Bentler (1999), fit indices indicated very good fit for the models estimated; RMSEA < 0.01, CFI > 99.9, TLI > 99.9, SRMR within <0.01 and SRMR between <0.01. Results showed that the variance components identified at the school class level constituted between 5.7 and 7.1% of the total variances in Disruptive Behaviour and Perceived Lack of Peace to Learn, respectively. Results revealed that classes with high scores for Disruptive Behaviour also had a tendency towards high scores for Lack of Peace to Learn, whereas results at the individual level showed a tendency for pupils who reported little Disruptive Behaviour to report more Lack of Peace to Learn. In addition, results showed that class level scores for pupils' reports of Disruptive Behaviour increased with year of schooling (ie, what grade they were in), whereas class level scores for Lack of Peace to Learn decreased with year of schooling. Finally, results indicate a tendency for classes with lower response rates to have higher scores for Disruptive Behaviour.

A follow up analysis, including a dichotomous self report variable identifying markedly disruptive pupils, showed stronger associations with Perceived Lack of Peace to Learn (0.74, $p < 0.05$) than the continuous variable for self reported Disruptive Behaviour.

From Table 5 it will be seen that school class variance components for grades received in the different subjects varied between 3.7% for written Norwegian and English to 5.7% for mathematics. Results from multilevel regressions showed that scores for pupils' self report of Disruptive Behaviour was moderately negatively correlated with subject grades at the individual level, whereas the school class level analysis yielded non-significant coefficients of association. Follow up analyses including a variable indicating the number of pupils classified as markedly disruptive (as in the GLM-approach) also yielded non-significant associations with subject grade scores

Table 5 Results from multilevel regression analyses for associations of disruptive behaviour with achieved subject grades (study one; pupils $N = 2{,}332$; school classes, $N = 105$)

	Grades							
	Norwegian		English		Mathematics		Overall	
	Within	Between	Within	Between	Within	Between	Within	Between
Intra class correlation		0.037		0.037		0.057		0.040
Independent variable								
Disruptive behaviour	−0.12**	−0.15	−0.09**	0.11	−0.14**	−0.23	−0.14**	−0.12
Control variables								
Gender	0.23**	–	0.09**	–	0.03	–	0.10**	–
Year of schooling	–	0.07	–	−0.02	–	−0.11	–	0.04
Class size	–	0.01	–	−0.01	–	0.12	–	−0.06
Response rate	–	0.16	–	0.27	–	0.09	–	0.20

Table 6 Results from multilevel regression analyses of associations of perceived lack of peace to learn with achieved subject grades (study one; pupils $N = 2{,}332$; school classes, $N = 105$)

	Grades							
	Norwegian		English		Mathematics		Overall	
	Within	Between	Within	Between	Within	Between	Within	Between
Lack of peace to learn	0.02	−0.51*	0.01	−0.22	0.03	−0.31	0.02	−0.42*
Control variables								
Gender	0.24**	–	0.09**	–	0.03	–	0.11**	–
Year of schooling	–	−0.06	–	−0.02	–	−0.25*	–	−0.15
Class size	–	0.08	–	0.02	–	0.17	–	0.12
Response rate	–	0.04	–	0.17	–	0.07	–	0.11

at the school class level. Non-significant associations were also found in analyses conducted for the sub-sample including only school classes with a response rate equal to or greater than 90%.

Results presented in Table 4 indicate that the general level of Peace to Learn in the school classes included in the study was little influenced by the response rate of the class. To further check for the possible bias of results due to the drop out of disruptive pupils from the sample, multilevel associations between Perceived Lack of Peace to Learn and subject grades were analysed. These analyses (see Table 6) yielded significant negative class level associations between scores for Lack of Peace to Learn and grades in Norwegian and overall subject grades. When the analyses were performed in the sub-sample of school classes with a response rate of 90% or more, the class-level association with grades in mathematics also became statistically significant ($r = -0.58, t = 2.70, p < 0.05$).

In the second study, teachers' evaluation of the pupils' behaviour was used to identify markedly disruptive pupils. Pupils described by the teacher as 'disruptive to large

extent' (4.1% of pupils) or 'very large extent' (2.5% of pupils) were classified as markedly disruptive. Three sub samples of pupils were created according to the number of pupils in their class classified as markedly disruptive. The first sub sample consisted of pupils from seven classes in which no pupils were classified as markedly disruptive, the second sub sample included the pupils from five classes with one pupil classified as markedly disruptive, and, finally the third sub sample was constituted by nine classes with two or more pupils classified as markedly disruptive.

Mean scores for Lack of Peace to Learn were compared between the three sub samples using univariate GLM with gender, year of schooling, number of pupils in class, the class's response rate, a variable indicating whether the individual pupil was classified as markedly disruptive, the indicator of pupils' cultural capital, and time used for homework were entered as covariates. Comparison of mean scores showed higher scores for reports of Lack of Peace to Learn among the sub sample of pupils in classes with more than one pupil classified as markedly disruptive. Overall mean scores for Lack of Peace to Learn were almost equal in the two samples (Study 1: M = 2.56, SD = 0.83; Study 2: M = 2.55, SD = 0.92).

Mean scores for subject grades were compared using multivariate GLM. In these analyses the corresponding grades received the previous term were entered as additional covariates. Results showed non-significant differences between the three sub samples. Results for the multivariate test were: F = 0.652, $p = 0.69$. Twenty five pupils did not complete the test in both English and mathematics, and to avoid reduction in the sample size included in the analyses, comparison of mean scores for results on the test were therefore conducted by two separate univariate GLMs. In these analyses the corresponding test result from the previous term was entered as an additional covariate. Results showed a slight tendency for the test mean scores to be somewhat lower among pupils in classes with markedly disruptive pupils. The differences were, however, not statistically significant. Follow up analysis including only the 16 classes with a response rate for teachers reports above 90% also yielded non-significant differences in academic outcomes between classes with and without markedly disruptive pupils.

Finally, pupils who, on the basis of teacher reports, were classified as markedly disruptive, had an overall grade score of 2.65 (SD = 0.70) compared to 3.67 (SD = 0.88) for the rest of the pupils. Results from ANOVA showed that this difference was highly significant ($p < 0.001$). Similar results were found for test results, with the disruptive pupils' sub sample achieving a mean score for the Mathematics test of 39.6 (SD = 14.21, $N = 26$) compared to 51.0 (SD = 16.36, $N = 427$) for the rest of the sample. Corresponding mean scores on the English test were 33.5 (SD = 14.21, $N = 26$) and 53.5 (SD = 16.36, $N = 428$). ANOVAs yielded p-values at 0.001 or lower for differences in mean test scores.

4 Discussion

Disruptive behaviour and lack of concentration on the learning tasks is a concern for Norwegian schools as well as for schools in other Western societies, as it is likely to influence pupils' learning outcomes. One worry in countries, which aim to include

pupils with behavioural problems in mainstream classes, is that this would have a negative effect on the learning results of fellow pupils. Few previous studies have addressed this issue specifically, and the main aim of the research presented here was to investigate to what degree average academic outcomes in secondary school classes are associated with the inclusion of markedly disruptive pupils.

Before discussing the findings, it is necessary to address some methodological considerations. The studies rely on pupil or teacher reports of disruptive behaviour. Both these sources of data may be biased by the individual response styles of pupils and teachers. However, previous research supports the validity of self-reports of behaviour and have shown that pupil self-reports of misbehaviour correspond rather well with parents' and teachers' reports of such behaviour (Loeber et al. 1991). Another constraint is that the validity and reliability of teachers' reports of disruptive behaviour may have been reduced by the single item approach. It would have been preferable for teachers to register several specific disruptive behaviours over a period of time since the scoring of this registration was used to classify pupils as markedly disruptive. For practical reasons, this was not possible in this study. However, the percentage of pupils identified as disruptive was within the expected range. The teachers described 6.6% of the pupils as showing a large or very large extent of disruptive behaviour. In a review of research, Sørlie (2000) estimated the prevalence of the more serious behavioural problems among Norwegian pupils in city samples to be 5–10%. The correspondence of expected and measured prevalence supports the validity of the teacher report of disruptive behaviour. The two samples were available in connection with intervention studies, and could have been biased by self-selection. However, concerning the sample in study one it should be noted that when data were collected it was very common for Norwegian schools to participate in anti-bullying interventions. Moreover, the intervention had a whole school approach and data were collected from all school classes in the selected schools and between-school differences tend to be low in the Scandinavian countries (Marks 2006). In addition, scores for Lack of Peace to Learn were very similar ($M = 2.56$ vs. 2.55). All these facts speak against a significant bias in the samples. Furthermore, the correspondence of expected and measured prevalence of disruptive behaviour also is an argument against this methodological limitation. If the level of disruption affects learning outcomes, self selection of classes based on the level of disruptive behaviour is likely to have resulted in mean grade scores for the samples that deviated distinctly from national mean grade scores. This was not the case. Statistics from the Norwegian Directorate for Education and Training show that mean grades received at the end of secondary school in 2006 were: written Norwegian, 3.9, written English, 3.8 and Mathematics, 3.4 (Utdanningsdirektoratet 2006). Comparison of mean grade scores with the two samples demonstrate that pupils' self-reports of grades in study one yielded mean scores slightly above this (Norwegian, 4.0, English 3.9, Mathematics, 3.7), whereas mean scores for the sample in study two were slightly lower for Norwegian (3.7) and English (3.7), but almost equal for Mathematics (3.4). So the comparison of mean grades scores and percentages of pupils classified as markedly disruptive do not suggest the samples are biased in a way that would affect results.

The cut-off values decide which pupils are classified as markedly disruptive and the division into sub samples could influence results. To address this possible

methodological problem, additional multilevel analyses with a continuous measure of disruptive behaviour were conducted in study one that had enough units at the school class level to perform such analyses. Similarly, possible lacking responses from or concerning markedly disruptive pupils would affect the classification of classes. The risk of this methodological problem is likely to increase with reduced response rate. To compensate for this possible methodological problem, response rates were entered as a covariate, and, the follow up analysis included only classes with a high response rate were conducted. The follow up analyses gave results similar to those of the whole subject sample, and so did not support the idea that lacking responses from or concerning markedly disruptive pupils may have significantly distorted the results. Finally, the strength of this study is that it makes it possible to use different approaches to the assessment of both disruptive behaviour and academic outcomes. In the second study it was also possible to correct for previous academic achievements. The strength of one approach is likely to compensate for possible weaknesses of another approach, and given consistent findings across the different approaches it is likely to give valid results concerning academic outcomes in classes with disruptive pupils.

In line with findings from previous studies (Kjærnsli et al. 2004; Lie et al. 2001), our findings suggest that Norwegian classrooms are perceived by pupils to be noisy and represent a learning environment where it could be difficult for pupils to find sufficient peace to learn. About 40% of pupils indicated that they had problems concentrating because of other pupils making noise, and more than 60% of pupils thought they would have learned more if there was more peace to learn in the classroom. Results from multilevel analyses showed that the level of Perceived Lack of Peace to Learn to some degree varied between school classes. About 7% of the variance in Perceived Lack of Peace to Learn was identified as between school class variance. However, the large percentage of within level variance suggests that perceived lack of peace to learn is a general phenomenon in Norwegian classrooms.

The comparison of mean scores between pupils with and without fellow pupils classified as markedly disruptive revealed a tendency for pupils in classes with more than one such pupil to report less Peace to Learn (see Tables 3 and 7). This tendency was clearly significant in study two in which the classification was based on teacher reports, and, marginally significant in study one where pupils' self report was used to classify markedly disruptive pupils. These findings indicate that perceived lack of peace to learn in Norwegian classrooms is, at least to some degree, related to the inclusion of markedly disruptive pupils. This interpretation is also supported by the finding that the self report based variable identifying markedly disruptive pupils accounted for more between level variance in Perceived Lack of Peace to Learn than the continuous variable for self reported Disruptive Behaviour. On the other hand, the response distributions for items assessing Disruptive Behaviour suggest that a relatively large proportion of the pupils contribute to the noisiness of the learning environment, and, that the inclusion of markedly disruptive pupils may not be the prime cause of noisy classrooms. Nearly 80% of pupils indicated that they spoke with other pupils without permission, about a third reported disturbing other pupils, and a quarter of the pupils indicated that they disturb the teaching.

There was a significant tendency for classes with pupils reporting little Peace to Learn to have lower mean subject grades scores (see Table 6). On the other hand,

Table 7 Mean scores and standard deviations, as well as results from comparisons of means scores for grades and perceived lack of peace to learn among sub samples of pupils in (**a**) classes with no pupils categorised as showing marked disruptive behaviour, (**b**) classes with one such pupil, and (**c**) classes with more than one such pupil

	None N teacher report = 165 N subject tests = 149 N pupil report = 141			One N teacher report = 118 N subject tests = 112 N pupil report = 114			More than one N teacher report = 213 N subject tests = 193/194 N pupil report = 192			Comparison of mean scores		
	M	SD	Adjusted M	M	SD	Adjusted M	M	SD	Adjusted M	df	F	p
Lack of peace to learn	2.41	0.92	2.39	2.41	0.88	2.29	2.74	0.93	2.84	2/439	14.584	0.000
Subject grades												
Norwegian	3.72	1.02	3.65	3.69	0.94	3.67	3.59	0.91	3.64	2/485	0.054	0.947
English	3.68	1.07	3.69	3.77	0.97	3.57	3.61	0.99	3.70	2/485	1.563	0.211
Mathematics	3.34	1.19	3.41	3.50	1.07	3.41	3.41	1.15	3.40	2/485	0.021	0.979
Overall	3.58	0.98	3.58	3.65	0.84	3.56	3.54	0.89	3.58	2/487	0.603	0.672
Results from tests												
English test	56.01	22.96	52.93	53.35	20.20	53.54	48.98	24.96	51.20	2/445	0.771	0.463
Mathematics test	49.56	15.06	51.56	49.13	15.07	49.45	51.79	18.16	50.04	2/444	1.118	0.328

Scoring ranges: lack of peace to learn 1–4.
Grades 1–6.
Test results 0–100 (percentage of correct responses). In all comparisons of mean scores gender, year of schooling, number of pupils in class, the class's response rate, a variable indicating if the individual pupil was classified as markedly disruptive, an indicator of pupils' cultural capital, time used for homework were entered as covariates. In comparisons of mean scores for academic outcomes the corresponding grades received/test-results from the previous term was entered as additional covariates, (study two, N: teacher report 496, subject tests 454/455, pupil report 447—Classification was based on teachers' report of disruptive behaviour)

although, there was a slight tendency for pupils in classes with more than one pupil classified as markedly disruptive to have the lowest mean subject grade and test scores, none of the differences were statistically significant. Comparisons of mean grade scores between sub samples with and without markedly disruptive pupils yielded very similar results whether the analyses were based on pupil or teacher reports (see Tables 3 and 7). Moreover, multilevel analyses of associations between the continuous variable for pupil reports of Disruptive Behaviour also yielded non-significant associations between Disruptive Behaviour and subject grades. So, although the results suggest significant associations between having disruptive fellow pupils and a Perceived Lack of Peace to Learn, as well as a tendency for classes with high scores for Perceived Lack of Peace to Learn to have lower average subject grade scores, the findings showed no significant general tendency for school classes with markedly disruptive pupils or high mean levels of Disruptive Behaviour to have lower average grades. The seemingly indirect link between having disruptive fellow pupils and grades achieved, via Perceived Lack of Peace to Learn, was not confirmed by the class level bivariate associations of Disruptive Behaviour with grades. This pattern of results may suggest that pupils' reports of Lack of Peace to Learn could to some degree be an expression of their not reaching their desired level of achievement and looking for an external cause.

The segregation of markedly disruptive pupils from mainstream classes is sometimes advocated by the public and politicians as a necessary measure to secure other pupils' peace to learn and in this way increase their level of achievement. Results from the present research indicate that the level of inclusion of disruptive pupils in Norwegian mainstream classes may cause some annoyance for fellow pupils and make them feel that their learning process is negatively affected. Results also indicate that pupils with more markedly disruptive behaviour themselves have lower academic outcomes than other pupils. However, results do not support the assumption that the inclusion of disruptive pupils is associated with significantly lower mean academic outcomes in school classes. Results should be interpreted remembering that Norwegian schools have relatively high levels of resources compared to other countries (Education at a glance, 2006). In addition, support for pupils with special needs is organized in a way that, for example, makes it possible to reinforce support for classes with high levels of disruption with extra teachers or assistants. These extra resources may be used for dividing classes into smaller groups of pupils making it possible to give additional help and guidance to all pupils in classes with disruptive pupils. Such measures could counteract the possible negative effects of having disruptive fellow pupils, and could explain why the between class variance in Perceived Lack of Peace to Learn after all was rather modest (7.1%).

Results suggest that, given sufficient resources and an appropriate special educational support system, it is possible to include pupils with relatively challenging behaviour in mainstream classes without this having a general negative impact on the academic outcomes of other pupils. However, it should be noted that some of the *most* behaviourally challenging pupils are still segregated from Norwegian mainstream classes. Previous research indicates that the segregation of children and adolescents with behavioural problems from pro-social peers may have negative effects on their behavioural development and their ability to function as constructive members of a society (Dodge 1993; Patterson et al. 1992; Walker et al. 1995) so it is encouraging to

find that there appears to be no negative affect on other pupils' learning outcomes if the children with behavioural problems are included. Moreover, the mixed findings concerning the class level associations of Disruptive Behaviour and Perceived Lack of Peace to Learn with grades achieved could indicate that disruptive behaviour is not a main cause of the relatively low academic performance among Norwegian pupils. However, it is possible that disruptive behaviour is a general phenomenon in Norwegian classrooms and that the relationship of this with academic outcomes will only be revealed in international comparisons.

Finally, this is one of very few studies that have specifically addressed academic outcomes among pupils in classrooms with disruptive pupils. Although, the consistency of findings across the different approaches supports the validity of our findings in the Norwegian context, more research is needed before general conclusions can be drawn. It would be beneficial if future research included observational methods in the measurement of disruptive behaviour. The validity of the research findings would be improved by longitudinal research designs which could better account for variables that may conceal associations between classroom disruption and academic outcomes.

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