

Relative risk (per unit increase in variable) of Down's syndrome for age, parity, gravidity, and previous miscarriage, 1986-95 and 1986-90, South Australia

Variable	Births and terminations				Births only			
	1986-95 (284 cases of Down's syndrome, 197 912 births)		1986-90 (128 cases of Down's syndrome, 98 561 births)		1986-95 (171 cases of Down's syndrome, 197 912 births)		1986-90 (100 cases of Down's syndrome, 98 561 births)	
	Relative risk (95% CI)	P value	Relative risk (95% CI)	P value	Relative risk (95% CI)	P value	Relative risk (95% CI)	P value
<b>Univariate analysis</b>								
Age	1.202 (1.142 to 1.266)	0.0001	1.170 (1.097 to 1.247)	0.0001	1.129 (1.103 to 1.155)	0.0001	1.131 (1.099 to 1.165)	0.0001
Parity	1.256 (0.997 to 1.581)	0.0769	1.260 (0.946 to 1.677)	0.1461	1.235 (1.105 to 1.380)	0.0006	1.245 (1.078 to 1.438)	0.0059
Gravidity	1.176 (0.988 to 1.398)	0.0931	1.168 (0.940 to 1.452)	0.1944	1.131 (1.036 to 1.235)	0.0099	1.107 (0.977 to 1.254)	0.1269
Previous miscarriage	1.148 (0.769 to 1.715)	0.5307	1.066 (0.599 to 1.896)	0.8338	1.078 (0.849 to 1.370)	0.5526	0.883 (0.559 to 1.394)	0.5751
<b>Multivariate analysis</b>								
Parity and age:								
Parity	0.964 (0.777 to 1.196)	0.7378	0.990 (0.751 to 1.306)	0.9442	1.038 (0.942 to 1.145)	0.4554	1.032 (0.912 to 1.168)	0.6215
Age	1.206 (1.142 to 1.273)	0.0001	1.171 (1.093 to 1.254)	0.0001	1.125 (1.098 to 1.153)	0.0001	1.128 (1.094 to 1.163)	0.0001
Gravidity and age:								
Gravidity	0.961 (0.810 to 1.141)	0.6463	0.972 (0.778 to 1.215)	0.8006	0.987 (0.909 to 1.071)	0.7541	0.949 (0.846 to 1.065)	0.3637
Age	1.208 (1.143 to 1.276)	0.0001	1.173 (1.095 to 1.258)	0.0001	1.130 (1.102 to 1.159)	0.0001	1.138 (1.100 to 1.177)	0.0001
Previous miscarriage and age:								
Previous miscarriage	0.929 (0.642 to 1.344)	0.6865	0.875 (0.516 to 1.483)	0.6003	0.933 (0.777 to 1.121)	0.4480	0.743 (0.529 to 1.044)	0.0584
Age	1.205 (1.142 to 1.270)	0.0001	1.173 (1.098 to 1.254)	0.0001	1.131 (1.103 to 1.159)	0.0001	1.138 (1.098 to 1.179)	0.0001

syndrome need to be based on population data that include births and terminations of pregnancy.

We acknowledge the role of South Australian midwives and neonatal nurses in providing perinatal data and of doctors in providing data on congenital abnormalities; the contribution of staff of the South Australian Births Defects Register and the Pregnancy Outcome Unit in processing and collating data on babies with Down's syndrome, births, and terminations of pregnancy; and the staff of the department of cytogenetics and molecular genetics, Women's and Children's Hospital, and of the department of cytogenetics, Queen Elizabeth Hospital, for providing cytogenetic data.

Contributors: AC initiated and planned the study, reviewed the literature, performed the univariate analysis, participated in the interpretation of data, and wrote the paper. KAM performed the Poisson regression analysis and participated in the planning of the study, the interpretation of data, and writing the paper. RJK participated in the planning of the study, the validation of

some case details, the retrieval and preparation of data for analysis, and editing the manuscript. EAH participated in planning the study, interpreting the data, and editing the manuscript. AC and KAM are guarantors for the paper.

Funding: None.

Conflict of interest: None.

- 1 Schimmel MS, Eidelman AI, Zadka P, Kornbluth E, Hammerman C. Increased parity and risk of trisomy 21: review of 37 110 live births [with commentary by R Lilford]. *BMJ* 1997;314:720-1.
- 2 McCullagh P, Nelder JA. *Generalised linear models*. 2nd ed. London: Chapman and Hall, 1989.
- 3 SAS Institute. *SAS/STAT Software: The GENMOD procedure, release 6.09*. Cary, NC: SAS Institute, 1993.
- 4 Halliday J, Lumley J, Watson L. Comparison of women who do and do not have amniocentesis or chorionic villus sampling. *Lancet* 1995;345:704-9.

(Accepted 27 February 1998)

## Bullying in schools: self reported anxiety, depression, and self esteem in secondary school children

G Salmon, A James, D M Smith

Highfield Adolescent Unit, Warneford Hospital, Oxford OX3 7JX

G Salmon, senior registrar in child and adolescent psychiatry

A James, consultant in child and adolescent psychiatry

continued over

*BMJ* 1998;317:924-5

Evidence exists of considerable problems with bullying and bullied children in secondary schools. In the largest survey in the United Kingdom to date 10% of pupils reported that they had been bullied "sometimes or more often" during that term, with 4% reporting being bullied "at least once a week."<sup>1</sup> The impact of the introduction of policies on bullying throughout a school seems to be limited.<sup>1</sup> The commonest type of bullying is general name calling, followed by being hit, threatened, or having rumours spread about one.<sup>1</sup> Bullying is thought to be more prevalent among boys and the youngest pupils in a school.<sup>2</sup>

We are unaware of any study that has examined the mental health problems of children who are being bullied. We assessed self reported anxiety, depression, and self esteem in bullied children and those who were not bullied and in bullies and those who were not bullies.

### Subjects, methods, and results

Four questionnaires (the Olweus bully/victim,<sup>2</sup> the short mood and feelings,<sup>3</sup> the revised children's manifest anxiety incorporating a lie scale,<sup>4</sup> and the Rosenberg self esteem<sup>5</sup> questionnaires) were anonymously completed by 904 pupils aged 12-17 in years 8-11 in two coeducational secondary schools. School A is a non-selective school in a socially disadvantaged urban area. School B is a rural grant maintained school in an area with a higher than average proportion of high social class households.

Logistic regression models were fitted to the proportions of bullied or bullying children using STATA. Categorical variables were school, school year, and sex. Anxiety, lying, esteem, and depression scores were treated as continuous variables. The table shows the odds ratios of the fitted logistic regression models.

Summary statistics and details of fitted models. Values are numbers of schoolchildren unless stated otherwise

Variable	Being bullied or bullying		Details of fitted logistic regression model			
	No	Yes	Parameter	Odds ratio (95% CI)	z	P value
<b>Bullied children (mean score for being bullied <math>\geq 2</math>)</b>						
School:						
A	377	24	B/A	0.37 (0.16 to 0.87)	-2.29	0.022
B	489	14				
School year:						
8	224	16				
9	237	8	9/8	0.34 (0.11 to 1.05)	-1.88	0.060
10	194	9	10/8	0.51 (0.16 to 1.61)	-1.14	0.253
11	211	5	11/8	0.53 (0.16 to 1.76)	-1.03	0.302
Sex:						
Male	439	23				
Female	427	15	Female/male	0.36 (0.15 to 0.89)	-2.22	0.026
Mean (SD) score:						
Anxiety	9.71 (6.00)	17.71 (6.75)	Anxiety	3.24 (1.78 to 5.91)	3.83	<0.001
Esteem	29.27 (4.75)	24.97 (6.38)	Esteem	1.15 (0.66 to 2.00)	0.49	0.627
Lying	2.52 (2.10)	3.37 (2.33)	Lying	1.96 (1.33 to 2.89)	3.39	0.001
Depression	5.88 (5.13)	12.92 (7.95)	Depression	1.45 (0.83 to 2.54)	1.29	0.196
<b>Bullying children (mean score for bullying others <math>\geq 2</math>)</b>						
School:						
A	382	19	B/A	0.63 (0.26 to 1.49)	-1.06	0.290
B	491	12				
School year:						
8	235	5				
9	235	10	9/8	4.65 (0.95 to 22.84)	1.89	0.058
10	189	14	10/8	8.37 (1.77 to 39.62)	2.68	0.007
11	214	2	11/8	1.31 (0.17 to 9.79)	0.26	0.795
Sex:						
Male	439	23				
Female	434	8	Female/male	0.24 (0.08 to 0.72)	-2.57	0.010
Mean (SD) score:						
Anxiety	10.11 (6.27)	8.32 (5.24)	Anxiety	0.36 (0.18 to 0.71)	-2.96	0.003
Esteem	29.08 (4.8)	29.48 (5.93)	Esteem	1.32 (0.75 to 2.31)	0.96	0.337
Lying	2.59 (2.19)	2.13 (1.31)	Lying	0.41 (0.23 to 0.76)	-2.87	0.004
Depression	6.12 (5.46)	7.77 (5.22)	Depression	3.29 (1.63 to 6.66)	3.32	0.001

For anxiety, esteem, lying, and depression the odds ratios are for a change of one standard deviation of 6.22, 4.92, 2.13, and 5.44 respectively (pooled SD). The prevalence of being bullied "sometimes or more often" was 4.2%. Significant variables ( $P < 0.05$ ) for being bullied were school, sex, and anxiety and lying scores; school year approached significance ( $P = 0.06$ ). The prevalence of bullying others "sometimes or more often" was 3.4%. Significant variables ( $P < 0.05$ ) for being a bully were school year, sex, and anxiety, lying, and depression scores. The esteem score featured in neither model.

Boys in year 8 in school A with high anxiety and lying scores were most likely to be bullied. Girls in year 9 in school B with low anxiety and lying scores were least likely to be bullied. Boys in year 10 with low anxiety and lying scores and high depression scores were most likely to be bullies. Girls in year 8 with high anxiety and lying scores and low depression scores were least likely to be bullies.

## Comment

Bullied children tend to be in the lower school years. The low prevalence of bullying (4.2%) may reflect the effectiveness of bullying interventions already in place in the two schools. Our data support the idea that bullied children are more anxious and bullies equally or

less anxious than their peers.<sup>2</sup> New findings from the study are the relation between having a high lying score and being bullied and having a high depression score and being a bully. The male to female ratio of bullies (3:1) is lower than that previously reported (4:1).<sup>2</sup> This may indicate that bullying interventions are having more of an impact on the direct bullying characteristic of boys and less on the indirect bullying more common among girls.

Our results should be viewed with caution because our study is small, but they suggest factors that could be important.

Contributors: GS and AJ initiated the study and designed the protocol. GS collected and collated the data. DS performed the analyses. GS, AJ, and DS interpreted the results, discussed their meaning, and wrote the article. AJ is the guarantor for the study.

Funding: Oxfordshire Health Services Research Fund.

Conflict of interest: None.

- 1 Smith PK, Sharp S, eds. *School bullying: insights and perspectives*. London: Routledge, 1994.
- 2 Olweus D. Bullying at school: basic facts and effects of a school based intervention program. *J Child Psychol Psychiatry* 1994;35:1171-90.
- 3 Angold A, Costello EJ, Messer SC, Pickles A, Winder F, Silver D. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. *Int J Methods Psychiatr Res* 1995;5:136-1-13.
- 4 Reynolds CR, Richmond BO. What I think and feel: a revised measure of children's manifest anxiety. *J Abnormal Child Psychology* 1978;6:271-80.
- 5 Rosenberg M. *Conceiving the self*. New York: Basic Books, 1986.

(Accepted 13 May 1998)

Centre for Statistics  
in Medicine,  
Institute of Health  
Sciences, Oxford  
OX3 7LF

D M Smith,  
senior medical  
statistician

Correspondence to:  
Dr James  
Tony.James@oxmhc-tr.  
angiox.nhs.uk