

Statistical Analysis of Self-Esteem and Strengths and Difficulties

from the 2010 Health and Wellbeing Survey of S1 to S4 Pupils in Glasgow City Schools

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Introduction

This report details the results of statistical analyses designed to explore the correlations between different indicators used in the Schools Health and Wellbeing Survey 2010. The Survey was administered to 50% of all S1 to S4 pupils from 30 secondary schools in Glasgow City and was completed by 8,282 pupils (83% response rate). The 2010 schools survey is part of a series; the first was first conducted in 2007 and it will be run again in 2014. The 2010 main survey report including background, results and methodology can be found at:

<http://www.phru.net/rande/Schools%20Survey%202010%20%202011%20Main%20Report/Glasgow%20City%20Final2.pdf>

A statistical analysis was carried out on the survey data to discover whether there was any association between the different indicators used. The two key indicators focused on are Self Esteem (Rosenberg)¹, and Strengths and Difficulties² questionnaires.

The correlation between these two variables was studied, and the report also looks at the correlation between these two indicators and selected variables. The variables analysed are:

- Upper (S3-S4) or Lower (S1-S2) School
- Been bullied or not been bullied
- Bullying or not bullying
- Future Aspirations
- Long-term limiting illness
- Carer or not
- Antisocial behaviour

The results of the analysis are shown in this report.

Methodology

Two statistical methods were used to analyse the collected data. The first test used was a Chi-squared goodness-of-fit test (Appendix 1), which determines how likely any difference between variables is down to chance. The second test used was Pearson's product-moment correlation coefficient (Appendix 2), which measures the linear correlation between two variables. These tests were both used to compare each of the variables with Self Esteem and Strengths and Difficulties.

¹ <http://www.wwnorton.com/college/psych/psychsci/media/rosenberg.htm>

² <http://bjp.rcpsych.org/content/177/6/534.full>

Results

For each indicator, the Chi-squared p-value and the Pearson coefficient were calculated against Self Esteem and Strengths and Difficulties. The full results are shown in Appendix 3.

From the Chi-squared results, we can see that there is an association between the variables analysed with Self Esteem and Strengths and Difficulties, but this does not tell us what the association may be.

From the Pearson coefficient results, it is apparent that Strengths and Difficulties had stronger correlations with the other variables than Self Esteem. Most of the correlations found between variables are weak correlations, but there are noticeable trends in the data, as both Self Esteem and Strengths and Difficulties recorded similar magnitudes of correlation coefficient.

Self Esteem vs Strengths and Difficulties

The correlation between Self Esteem and Strengths and Difficulties was the strongest correlation between any of the variables. The correlation was negative, which means that as the Strength and Difficulties score increases (indicating a greater level of difficulties), then the Self Esteem score decreases (indicating a low level of self esteem). This is highlighted in Figure 1.

Figure 1

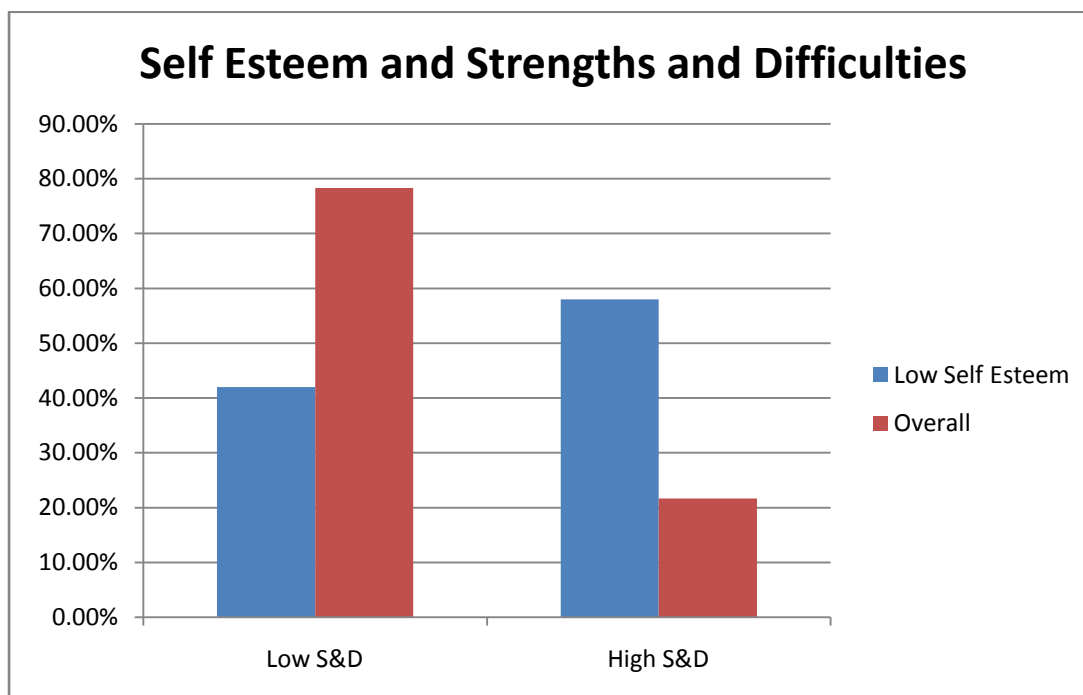


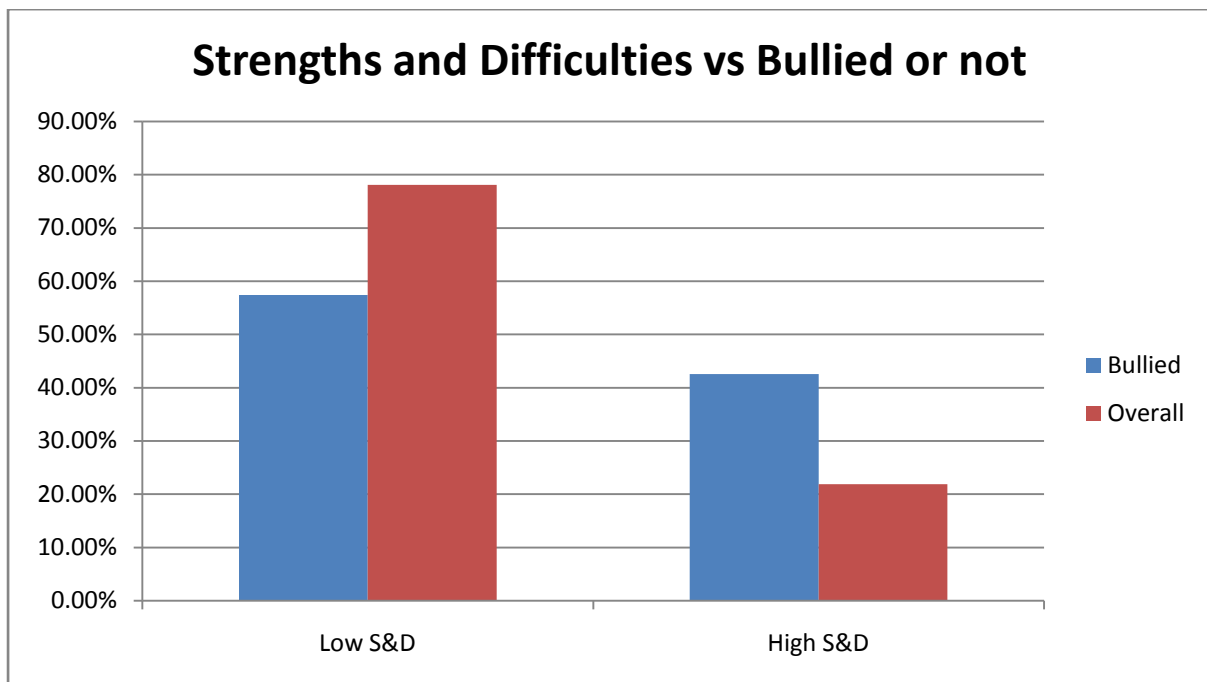
Figure 1 shows that 78% of all pupils recorded a low level of difficulties (good S&D), and the remaining 22% recorded a high level of difficulties. The blue bar shows pupils whose scores indicated low self esteem. Of pupils with low self esteem only 42% recorded a low level of difficulties, which is far lower than the overall percentage of 78%. 58% of pupils with low self esteem recorded a high level of difficulties, which is greater than the average of 22%. This highlights the correlation between strengths and difficulties and self esteem – low self esteem is linked with a higher level of difficulties.

Due to the correlation between Strengths and Difficulties and Self Esteem, and the higher levels of correlation found against Strengths and Difficulties, we have used only the Strengths and Difficulties data to highlight the other significant results.

Strengths and Difficulties vs Bullied or not

The Strengths and Difficulties scores had a noticeable association with whether a pupil had been bullied or not (Figure 2).

Figure 2

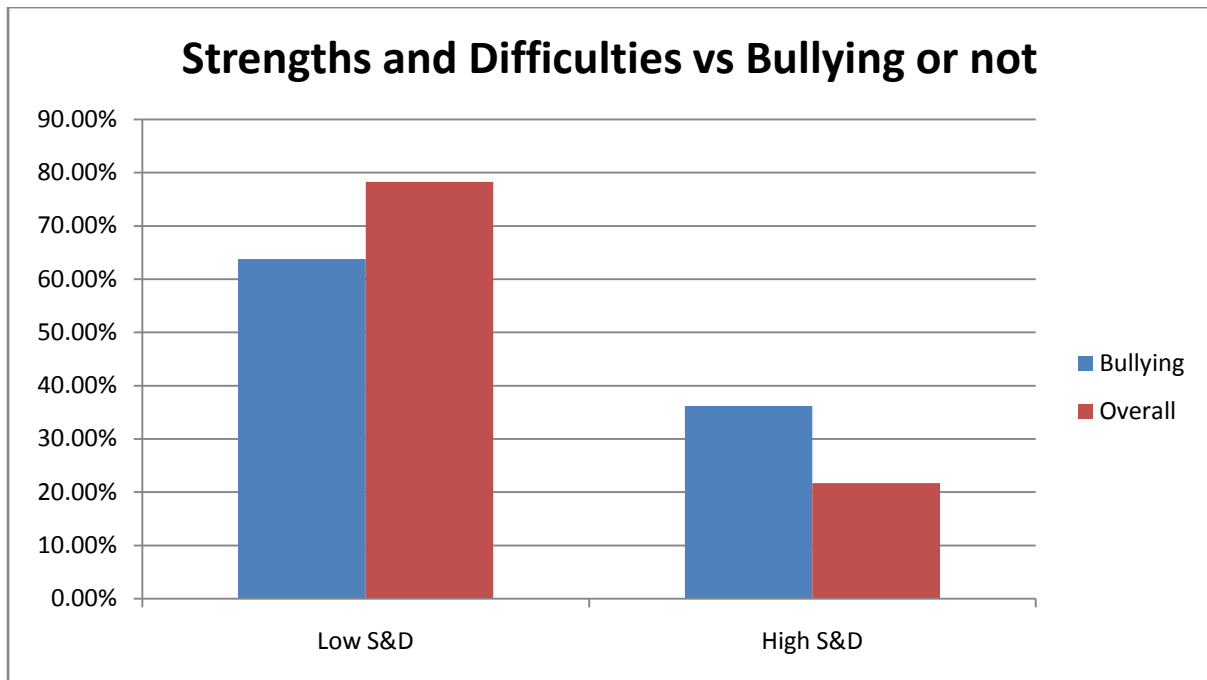


Of the pupils who had been bullied at some time during the last year, 43% recorded a high level of difficulties. This is much greater than the overall average of 22%. 57% of pupils who had been bullied showed a low level of difficulties, which is lower than the overall proportion of pupils that showed low levels of difficulties (78%). This emphasises the correlation between a pupil that has been bullied in the last year, and greater strengths and difficulties. However this does not prove that there is a causal relationship.

Strengths and Difficulties vs Bullying or not

There is also an association between Strengths and Difficulties and whether a pupil has admitted bullying someone in the last year. 64% of pupils who had admitted bullying had low levels of difficulties, and 36% had high levels of difficulties. This was a large difference from the entire survey, where 78% of pupils had low levels of difficulties and 22% had high levels (Figure 3). This illustrates the correlation between bullying and high levels of difficulties.

Figure 3



Other results

There was also a weak correlation between high levels of difficulties and being a carer, and another weak correlation between high levels of difficulties and future aspirations. Pupils with lower levels of difficulties were more likely than those with high levels of difficulties to expect to go into further education after finishing school.

Further Analysis

The Strengths and Difficulties score was deconstructed into its components and used to further analyse the correlations for more specific associations. The Peer problems section was then used to compare with the other variables. The only significant correlation discovered was with whether a pupil has been bullied or not.

Figure 4

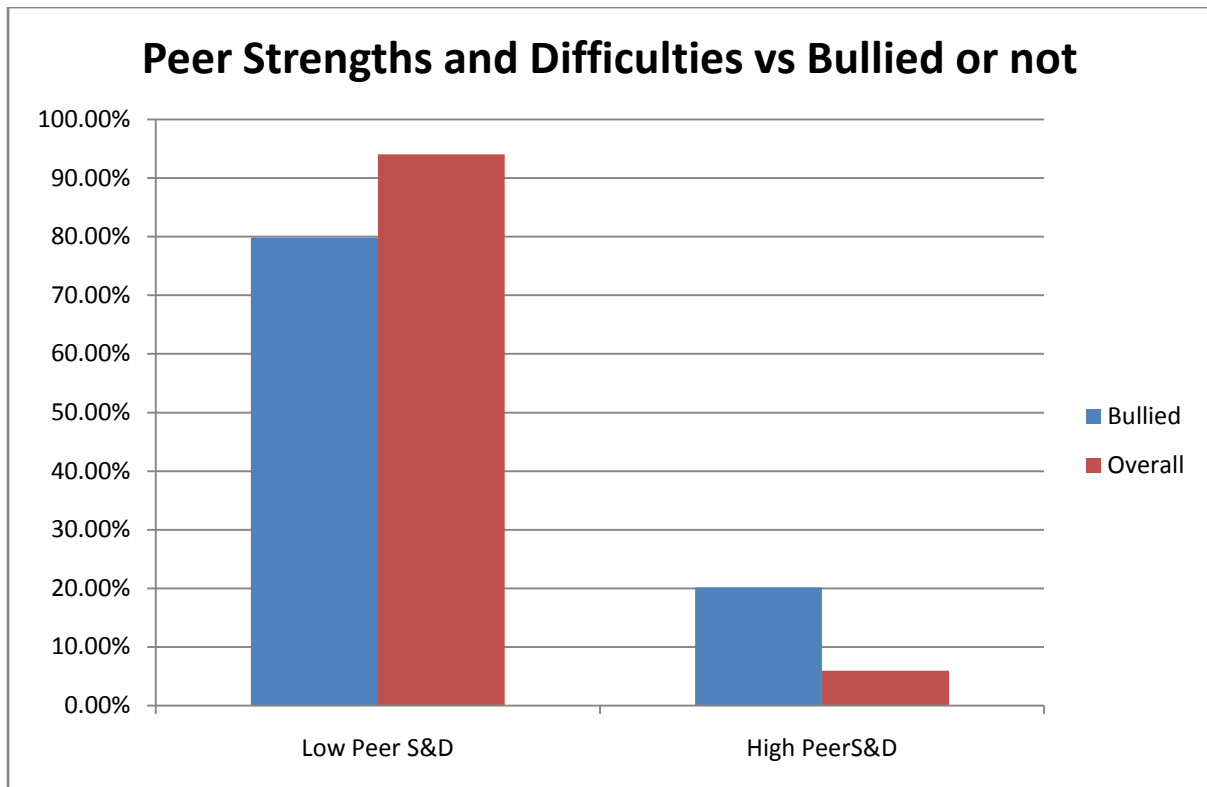


Figure 4 shows that there is a correlation between Peer Strengths and Difficulties and whether a pupil has been bullied or not. Overall, 94% of pupils have low peer difficulties compared to 6% who have high difficulties. Of the pupils who have been bullied, 20% have high peer difficulties – much greater than the overall average. 80% of pupils who have been bullied have low peer difficulties, lower than 94% which is the average for the entire survey.

The Conduct component of the Strengths and Difficulties Indicator was also analysed against whether a child had admitted bullying or not.

Figure 5

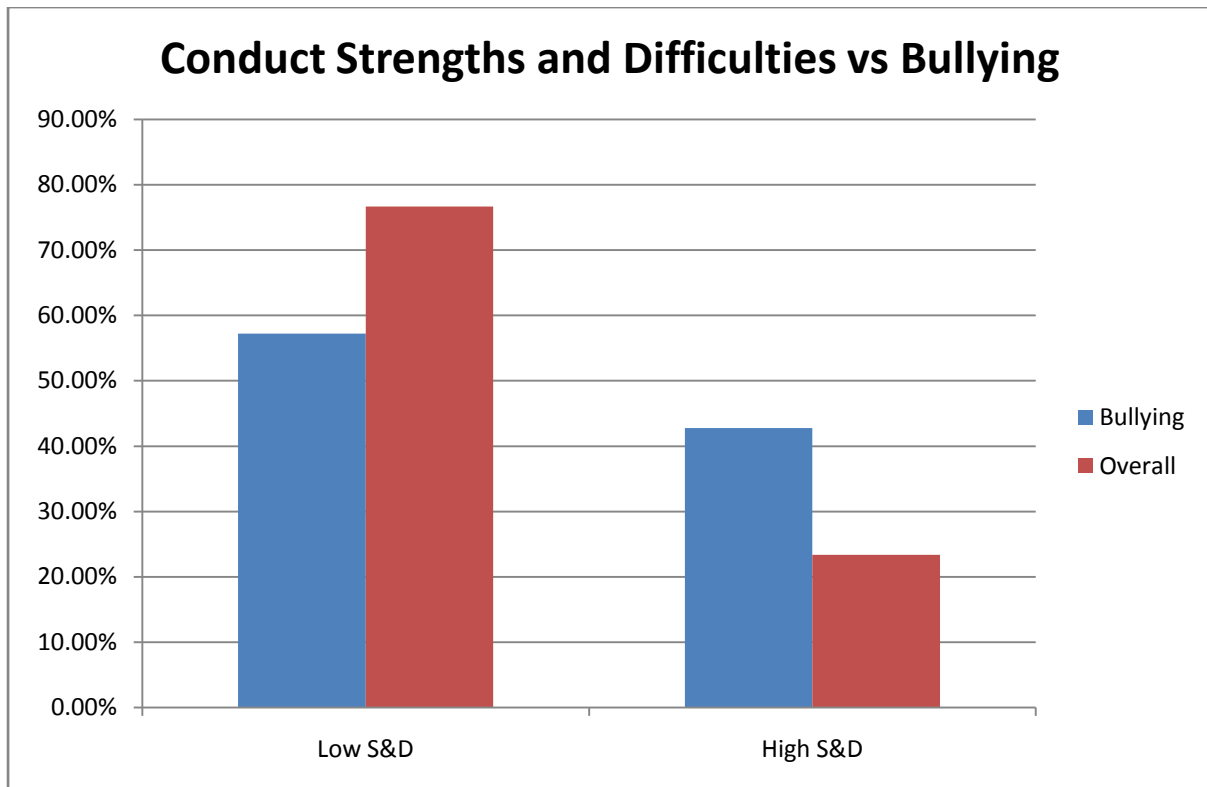


Figure 5 indicates that there is a relationship between high Conduct Strengths and Difficulties scores and bullying by pupils. The proportion of children who have high conduct difficulty scores is 23% - much smaller than the 43% of children who admitted bullying and scored highly in the Conduct component of the Strengths and Difficulties test.

Overall, 77% of pupils have low conduct difficulties, whereas only 57% of children who admitted bullying have low difficulty scores. This highlights the correlation between the two variables, and the increase in conduct difficulty scores for children who admitted bullying.

Conclusion

Overall, there are no very strong correlations apparent in the survey data. There exist many weak correlations but this does not indicate a causal relationship.

Strengths and Difficulties appears to highlight the same trends as Self Esteem, but the correlations are marginally stronger with Strengths and Difficulties. The most notable correlations are Strengths and Difficulties and whether a child has been bullied, and Strengths and Difficulties and whether a pupil has admitted bullying someone.

Appendix 1

The Chi squared goodness of fit test, used to test statistical models, describes how likely any difference between the sets of data arose by chance. It analyses the difference between the observed values and the expected values. The test statistic is calculated as follows:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(A_{ij} - E_{ij})^2}{E_{ij}}$$

Where A_{ij} is the observed value and E_{ij} is the expected value. The test statistic is then compared against the chi-squared distribution to estimate the likelihood of it occurring by chance.

<http://office.microsoft.com/en-us/excel-help/chitest-HP005209012.aspx>

Appendix 2

Pearson's Correlation Coefficient analyses two different variables (in this case performance indicators) and gives a value between +1 and -1, where +1 indicates total positive correlation, -1 indicates total negative correlation, and 0 indicates no correlation. The correlation coefficient r is calculated as follows:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

<http://office.microsoft.com/en-us/excel-help/pearson-HP005209210.aspx>

Appendix 3

Chi Squared p-values	Strengths and Difficulties	Self Esteem	Peer Strengths and Difficulties
School Level	<0.0001	<0.0001	0.017
Bullied	<0.0001	<0.0001	<0.0001
Bullying	<0.0001	<0.0001	<0.0001
Future Aspirations	<0.0001	<0.0001	0.005
Long-term limiting illness	<0.0001	<0.0001	<0.0001
Carer	<0.0001	<0.0001	<0.0001
Antisocial behaviour	<0.0001	<0.0001	0.428

Pearson Coefficients	Strengths and Difficulties	Self Esteem	Peer Strengths and Difficulties
School Level	-0.085	0.098	-0.000
Bullied	0.199	-0.273	-0.379
Bullying	-0.102	0.234	0.148
Future Aspirations	-0.091	0.109	0.065
Long-term limiting illness	0.020	-0.026	-0.002
Carer	0.097	-0.137	-0.078
Antisocial behaviour	0.013	-0.059	0.032

Conduct Strengths and Difficulties	Chi squared p-value	Pearson correlation coefficient
Bullying	<0.0001	0.271