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Is there a correlation between Behaviour Points and Ability Sets in Maths, and how does this vary across year groups?

Introduction & Aims

Reward and sanction systems are recognised as a pillar of behaviour management in schools (Bennett, 2017), and a behaviour points system is a common implementation of this – where students' behaviour both positive and negative can be recognised.

Boaler (2013) claims that students can exhibit poor behaviour if they do not see the point in the work they are doing, and this may be linked to students' abilities.

This study will recognise and analyse trends in the ratio of positive to negative behaviour points given to students based on their mathematical ability sets, in order to assess Boaler's claims, and it will also observe how this differs between year groups.

Methodology

This study is based on secondary data gathered from my placement B school, which shows the number of positive and negative behaviour points obtained by every student in the school during the 2022/23 academic year to date, and what maths class they are in. This has been processed to observe a ratio of positive to negative behaviour points for higher, middle, and lower ability maths groups in each year group. The use of a ratio negates any bias introduced by class sizes, etc.

A limitation of this is that the splitting of up to 11 mathematics ability sets per year group into three categories (higher, middle, lower) can be ambiguous.

Results

Fig 1 shows that across all year groups, higher ability sets possess the highest ratio of positive to negative behaviour points, and the lower ability sets have the lowest ratio. The higher and middle ability sets in year 8 and the lower ability year 9s produce an anomaly when compared to other year groups.

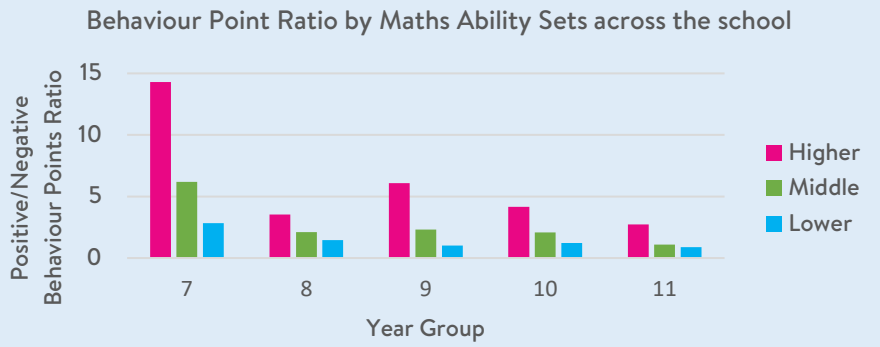

Fig 1: A comparative bar chart showing the ratio of positive to negative behaviour points given by mathematical ability set in each year group.

Fig 2 shows the difference between higher, middle, and lower ability sets across the school. In year 7, the behaviour point ratio of higher ability sets is ~2.25x that of middle ability sets, and middle ability is ~2.25x lower ability. This varies per year group, and a weak negative correlation is shown as you move up the school.

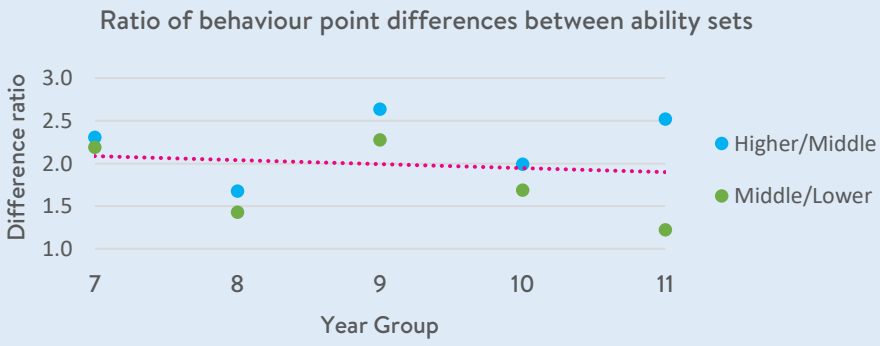

Fig 2: The difference ratio r_i between the behaviour point ratios of lower & middle ability sets (green), and middle & higher ability sets (blue) in each year. E.g. the behaviour point ratio of higher ability sets is $r_{h/m}$ times that of middle ability, and middle ability is $r_{m/l}$ times that of lower ability.

Conclusion

The data shows that there is indeed a correlation between behaviour points and ability sets in maths, with higher-ability sets achieving a ratio of positive to negative behaviour points on average four times larger than that of lower-ability sets, and middle-ability sets consistently sitting intermediately across all year groups.

Across year groups, the difference between the behaviour point ratios of the different ability sets varies, with the average difference ratio peaking in year 9. In year 11, the difference between higher and middle ability sets is far more prominent than that between middle and low ability sets.

Interestingly, year 8 averages the least variation between ability sets and year 9 averages the most. This may perhaps be attributed to them being the groups who completed KS2 during COVID, which Bagnall, Skipper & Fox (2022) note to have had significant impacts on behaviour. If these years are taken as anomalies, the data shows that the correlation between ability sets in maths and behaviour point ratios marginally weakens as you move up the school.

Future Work

Taking this forward, a longitudinal study allowing for observation of the behaviour point ratio of one particular year group (such as the current year 7s) throughout their entire time at the school could be interesting and help answer the question of whether the downward trend in behaviour as recognised here is attributed to age or if it is more a reflection of the individuals in each year group.

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Reflective Report: "Is there a correlation between Behaviour Points and Ability Sets in Mathematics, and how does this vary across year groups?"

Word Count: 1614

Introduction.

Behaviour for Learning plays a crucial factor in the effectiveness of both teaching and learning in schools, and thus the learning of students in different classes can be impacted by differing standards of behaviour in each class (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2012). With mathematics classes often being based on ability, this study observes the behaviour of higher, middle, and lower ability sets in mathematics as illustrated by the use of behaviour points acting as a reward and sanction system, which Bennett (2017) recognises as a pillar of behaviour management in schools.

During my time on school placements, I have identified higher occurrences of negative behaviour incidents in lower-ability classes, and Boaler (2013) claims that students may exhibit poorer behaviour if they do not see the point in the work they are doing. This could perhaps be the case if students only hold an instrumental understanding (Skemp, 1976), which is common among lower ability sets by their nature. With this, it may be suggested that students in lower ability sets will possess a lower proportion of positive behaviour points and a higher number of negative points than their counterparts in higher ability mathematics classes. This is precisely the hypothesis which I held at the beginning of the study and is what I set out to investigate using the data gathered from my placement B school, in order to inform future interventions in my teaching career.

Discussion/Analysis.

To determine the validity of the hypothesis, I gathered behaviour data for the academic year to date (2022-23) for the entire student population of the school (1242 students) and was able to sort this by maths class. Immediately, several things became clear when looking at the data. Firstly, the sizes of the maths classes at the school differ vastly, with some at full capacity of 32 and others less than half this size. Also, the way in which each teacher makes use of the behaviour points system differs too, with some teachers giving multiple behaviour points every lesson, whilst some only using them on occasion. Whilst this does introduce an unavoidable element of inaccuracy in behaviour points' true reflection of student behaviour, to negate any bias in the data presented by varying class sizes or uses of behaviour points, I developed a ratio from the raw data. The use of a ratio reduces any influence of these factors in the presentation of data and thus allows for a more genuine picture of the link between behaviour points and mathematical ability. In order to make

the data more meaningful, I categorised each of the up-to-eleven maths sets in each of the five year groups as higher, middle, or lower ability in order for the data to be compared.

From the data presented in Figure 1 (See Appendix A), it can be observed that there is a consistent trend across all year groups by which the population of higher ability sets achieve a higher ratio of positive to negative behaviour points, with lower ability sets achieving the lowest ratio and middle ability sets consistently sitting intermediately. This confirms the hypothesis and further corroborates research conducted by Papachrisou, Flouri, Joshi, Midouhas, & Lewis (2022), which recognises that students placed in lower ability groups have increased hyperactivity and emotional symptoms. The data also aligns with the aforementioned claims of Boaler (2013), but of course does not provide any insight into the causation as explored both by Boaler (2013) and by Papachrisou et al (2022).

Schnitzler, Holzberger, & Seidel (2021) identify that students' self-perception of their own academic abilities is an important antecedent of student engagement and is subsequently reflected in behaviour data. Students are rewarded positive behaviour points for constructive contributions in classes, and thus students with a negative self-perception of their ability – commonly the case with lower ability students – may therefore possess a lower behaviour point ratio, as substantiated by my data.

The second dimension to my research question involved observing changes to the ability-based behaviour trends over time. Figure 1 shows that the overall trend stays consistent throughout the whole school, however several observations can be made on how this trend progresses as you move up the school. Firstly, it may be observed that – aside from some anomalies potentially owed to the impact of COVID on the primary-secondary school transition (Bagnall, Skipper, & Fox, 2022) – there is a downward trend in behaviour as you move up the school, with year 7 achieving an average behaviour point ratio almost four times that of year 11. More significantly though, it may be seen that the variation in behaviour between the different ability sets is vastly different per year group, and this is illustrated in Figure 2 (Appendix A).

Using a ratio to exclude the impact of the downward trend in behaviour as you move up the school, Figure 2 demonstrates that the difference in behaviour point ratios between higher and middle sets and that between middle and lower sets respectively differ massively as you move up the school. In year 7, the ratio between higher and middle, and middle and lower ability sets sits roughly equal, at around 2.25. Moving up the school, however, the difference between the behaviour point ratio of higher and middle sets seems to grow further from that between middle and lower sets, meaning that by year 11 the behaviour in middle and lower sets sits almost equal, whilst the

behaviour of higher ability sets is around 2.5 times this – demonstrating that there is a huge contrast in the behaviour of high ability sets when compared to middle and lower ability sets who exhibit more negative behaviour – as identified in Figure 1.

A downward trend in engagement is identified by Ross (2009), who notes that the proportion of students becoming disengaged with their learning over time increases – notably in the transition between years 9 and 10. Combined with the aforementioned explanations of Schnitzler et al (2021), this could explain the trends recognised, and could potentially be interesting to analyse in future research. Regardless of causation, I feel that my data does align with the research mentioned throughout, and I have yet to find any research in disagreement with this.

Further Work.

Being only based on data from one school, it may be argued that the sample size for this study is relatively small. It may therefore be interesting to take this forward on a larger scale, taking data from multiple schools with contrasting characteristics – for example, schools which are geographically far apart, and schools with different behaviour policies. Boys & Hooley (2016) highlight varied levels of disengagement in school geographically across the UK, and so consideration of this would allow for a more general picture of the relationship between behaviour and mathematical ability. Some schools may even be able to contribute another dimension to the study: the impact of mixed ability setting on the trends. In these schools, students could still be categorised by ability based on their attainment, but the data may display different trends to those identified in this study.

Furthermore, I feel that it may also be interesting to look at the trend longitudinally for one particular year group throughout the whole of their schooling. This would allow for a true image of the trend over time without the influence of factors which affect individual year groups in different ways, such as COVID – which seemingly influenced the results I gathered, lending anomalies to the data for the students who transitioned from primary to secondary school during COVID (2020-2021) times (Bagnall, Skipper, & Fox, 2022).

A qualitative study could also provide an interesting insight into the explanation of certain data trends recognised in this small-scale study. For example, it may be interesting to explore in further depth the reason for the greater diversity in behaviour point ratios between middle and higher ability sets compared to the difference between lower and middle sets in upper years of the school, building upon the research mentioned in relation to this (Ross, 2009; Schnitzler, Holzberger, & Seidel, 2021).

Conclusion.

Whilst causation is not certain, it is clear to see that there is indeed a correlation between behaviour and ability in Mathematics. My data demonstrates that students in higher ability sets exhibit a significantly higher proportion of positive behaviour than negative behaviour, and that this proportion decreases with students' abilities as labelled by the mathematics set they are in. As well as being shown by the data from my placement B school, this conclusion is also suggested by pre-existing literature; namely that of Ross (2009), Boaler (2013) and Papachrisou et al (2022).

As a teacher, this trend is beneficial to be aware of both in maintaining realistic expectations for classes as well as for planning and teaching adaptively (Department for Education, 2011). Also, an awareness of the trend over time and the associated research and literature already in existence is useful to be aware of as it will inform my future practice in a way to attempt to combat reduced engagement from lower attaining students in order to improve behaviour and subsequently hopefully improve attitudes and attainment in mathematics across the board.

During my ECT years, I shall work to establish high expectations for all of my classes (Department for Education, 2011) and build positive relationships with the students within in order to maintain positive behaviour, engagement and attitudes in mathematics lessons, regardless of the ability level of the class. I shall maintain an awareness of the trends identified in this study but will not let these dictate lower expectations for lower ability groups. Instead, I shall make a conscious effort to uphold high expectations for all groups which I teach through the implementation of research-informed behaviour management strategies.

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Appendices.

Appendix A.

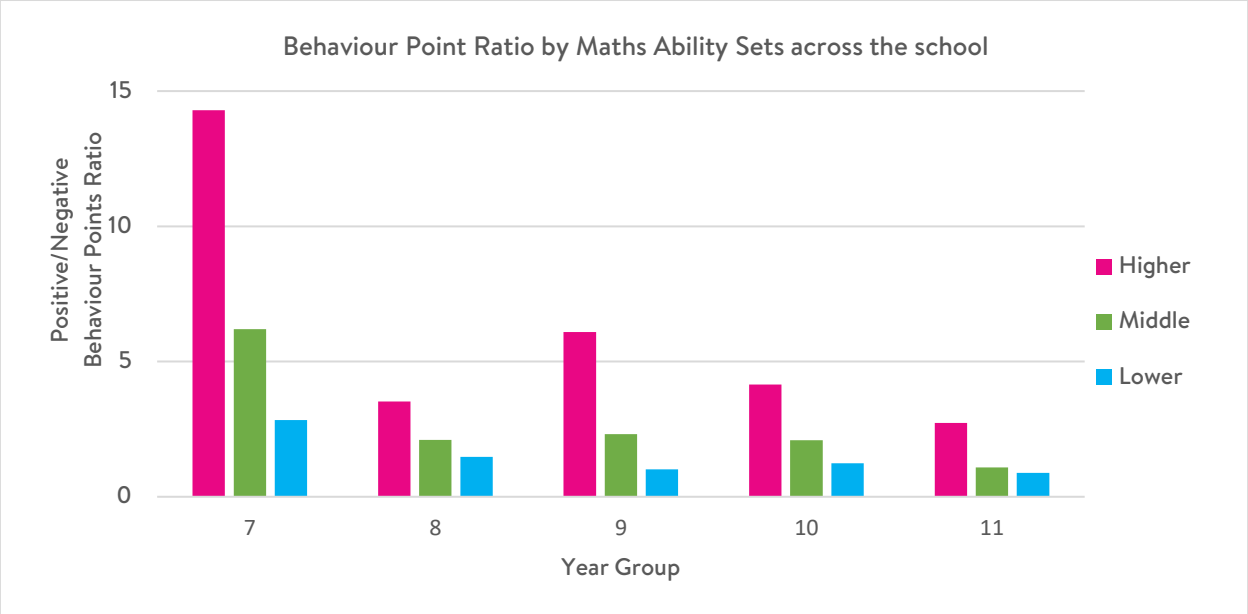

Figure 1: *A comparative bar chart showing the ratio of positive to negative behaviour points given to students in each year group, separated by Mathematical ability according to sets.*

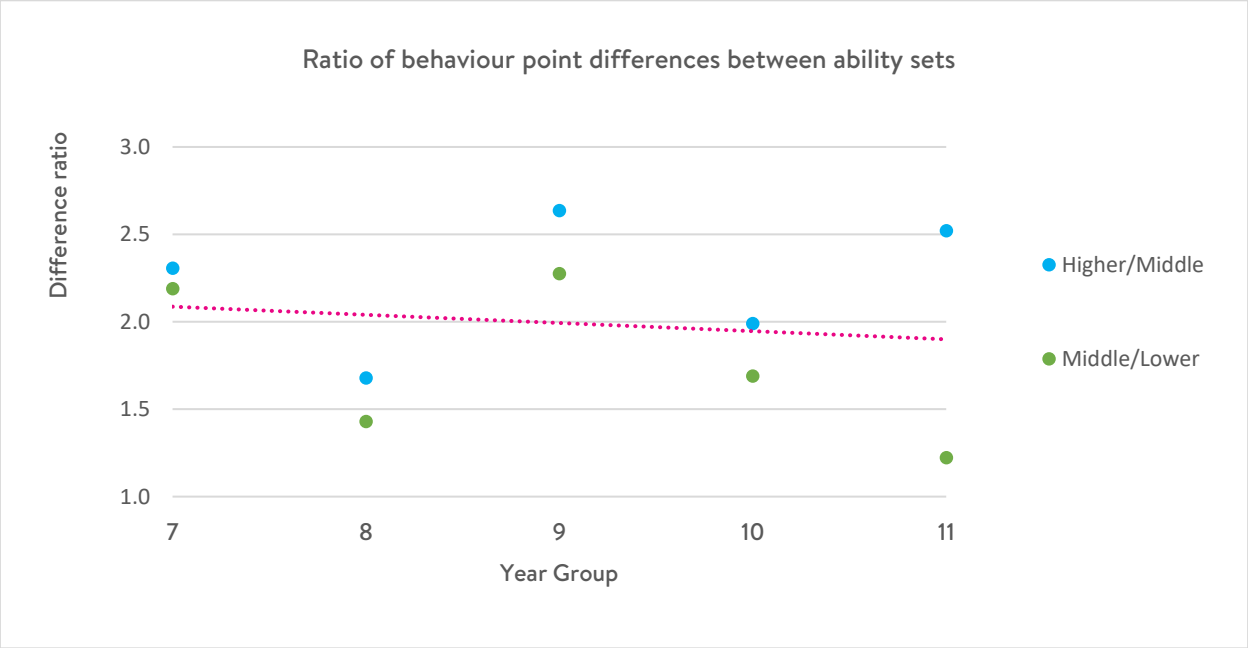

Figure 2: *The difference ratio between the behaviour point ratios of lower & middle ability sets (green), and middle & higher ability sets (blue) in each year group. This is the scale factor between each of the bars in Figure 1. For example, in year 11 the behaviour point ratio of middle-ability sets is ~1.2 times that of lower ability, and that of higher ability is ~2.5 times the behaviour point ratio of middle ability sets.*