Maths anxiety in psychology undergraduates: A mixed-methods approach to formulating and implementing interventions

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Due to the empirical nature of the discipline, psychology students, during the course of their degree, are required to become proficient with a range of quantitative methods. Unfortunately many of these students experience high levels of maths anxiety, which can have a damaging effect on this aspect of their educational development. The first study in this paper used focus groups to identify, from psychology undergraduate and postgraduate students, potential interventions that could be used to reduce anxiety in an undergraduate sample. The second study implemented those interventions that were deemed valid and practical on a sample of 246 psychology first and second year undergraduates. The effectiveness of these interventions was mixed, but does suggest further avenues that tertiary educational institutions could take to reduce maths anxiety in their student body, in particular enhancing the use of real-life examples in quantitative methods teaching.
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Introduction

MATHEMATICS ANXIETY is defined in the literature as feelings of tension or fear that appear when a person is required to undertake a maths performance task (Ashcraft, 2002). At university level, it can lead to students purposely avoiding subjects or modules that have a high maths content (e.g. Hopko et al., 1998; Llabre & Suarez, 1985) and, post-university, taking a less than optimum career path (Durrani & Tariq, 2012). A number of studies have attempted to reduce maths anxiety in undergraduate students through the use of interventions. Iossi (2007) categorised these under three different headings: curricular, instructional and non-instructional strategies. Here we review the literature using Iossi's categorisations.

Curricular strategies refer to courses offered by universities that aim to reduce student maths anxiety. Carroll & Gill (2012) and Gordon & Nicholas (2013) discussed the use of 'mathematics bridging' courses to reintroduce mathematics to new university students, their findings suggesting that such courses can ameliorate some aspects of anxiety. Other research (e.g. Keeley, Zayac & Correia, 2008; Maloney & Beilock, 2012) supports the use of lectures designed to instruct potentially at-risk students on the nature of maths anxiety, and strategies regarding how it can be reduced. In contrast, Wilson (1999a) stated that directly addressing anxiety might increase student discomfort. Also, while curriculum strategies are used in many universities, literature on the success of these interventions is scarce. Hembree (1990), in his meta-analysis of the literature, concluded that such interventions were, in fact, not effective in significantly reducing student maths anxiety.

Instructional strategies, according to Iossi (2007), derive from the teacher, instead of the general university-originated curriculum. These can include manipulation-based interventions, involving students working with some applied, hands-on task.

D'Andrea & Waters (2002), for example, explored the effect of teaching quantitative methods via the use of short stories. Likewise, Henrich & Lee (2011) had their participants try and reduce anxiety by introducing a service-learning component to a quantitative methods course, where the students gave maths tuition to school-children. Both studies showed positive findings (although D'Andrea & Waters' study used very small sample sizes, and Henrich & Lee did not measure any change quantifiably, drawing these results into question).

Other studies have attempted to use real-life examples in the teaching of quantitative methods. This is in order to make the content of such courses appear less abstract and more applicable to everyday life (e.g. Renzulli, 2000; Shull, 2009). However, while much theoretical literature supports such strategies (e.g. Ramjan, 2011), when students are asked to rate the effectiveness of proposed interventions, introducing real-life examples is often considered one of the least likely to be effective (Wilson, 1999b).

Group-learning is another manipulation-based instructional intervention. Group work (e.g. Borresen, 1990; Uusimaki & Kidman, 2004) has been shown to effectively reduce maths anxiety. Townsend, Moore, Tuck & Wilton (1998), on the other hand, found that group learning was not an effective intervention. Other studies have concluded that the utility of group learning seems to be strongly dependent on the size and the content of the groups (i.e. friends as opposed to strangers) (Wilson, 1999b).

The third class of interventions proposed by Iossi (2007) consists of non-instructional strategies. These can include behavioural interventions (e.g. Zettle, 2003), cognitive treatments such as counselling and cognitive modification (e.g. Hendel & Davis, 1978; Suinn & Richardson, 1971) and cognitive behavioural strategies, such as Cognitive Behavioural Group Therapy (e.g. Karimi & Venkatesan, 2009). Reports on the efficacy of such interventions are, however, mixed (Hembree, 1990).

In conclusion, considerable previous research has attempted to find ways to actively reduce maths anxiety. Unfortunately, not only does a lack of consensus exist regarding the best form potential interventions can take but, as a number of meta-analyses confirm (e.g. Zientek, Yetkiner & Thompson, 2010) many of the studies are flawed at some fundamental level, whether this is to do with having no controls, or through not properly quantifying any changes that may have taken place.

The present study

This research had two main aims. The first was to learn, from the students themselves, what techniques would be effective in reducing maths anxiety. To achieve this, focus groups were carried out on undergraduate and postgraduate psychology students. The second was to implement those strategies which were determined to be feasible and practical, in a way that would be experimentally valid, via the use of interventions. No research has before attempted to implement maths anxiety interventions based on both previous literature and student responses.

Study 1 – focus groups

Before an effective intervention could be administered, it was deemed necessary to determine which interventions would have the greatest chance of success. A number of potential intervention strategies were outlined in the introduction, but these are generally formulated based on previous research carried out on potentially quite different experimental samples. While the interventions presented in Study 2 will also be informed by previous literature, their design will additionally be based on the qualitative findings of Study 1. This will, potentially, give much greater validity to Study 2.

Psychology students were chosen for this study as the course consists of a heavy quantitative component involving statistics. Despite the importance of statistics in the psychology curriculum, it remains one of the most poorly performed components of the

course (Dempster & McCorry, 2009; Seabrook, 2005) with students tending to do badly on statistics exams (British Psychological Society, 2003; Mulhern & Wylie, 2005).

Study 1 method

Participants

Thirteen undergraduate psychology students and nine postgraduate psychology students (all PhD students) from a UK tertiary-level psychology institution participated in this study. Participants were recruited on a volunteer basis, with students replying to a general invitation email. The undergraduate participants were split and interviewed in their three different year groups. There were four participants in the Year 1 group, five in the Year 2 group, and four in the Year 3 group. Four of the students were male and three would have been considered as mature students (i.e. over 21 years of age).

Nine postgraduate participants (4 male) were also recruited on a volunteer basis. They were randomly allocated to one of two groups of five and four individuals, respectively. PhD students were included in this study as (a) all worked closely within the undergraduate quantitative methods course, as teaching assistants, demonstrators and/or coursework markers and (b) all had been psychology undergraduates themselves, allowing further insight into the maths anxiety felt by undergraduate samples. One student was in his early forties while the remainder were between the ages of 22 and 30.

Procedure

Ethical approval was obtained from the School of Psychology Research Ethics Committee and all participants gave informed consent prior to participation. Only one principal question was asked; 'What interventions would you suggest for curing maths anxiety? Any ideas?' Each session lasted approximately 45 minutes and was recorded and transcribed, with the transcriptions being subjected to a deductive thematic analysis based on critical realist epistemology (Braun & Clarke, 2006). Specific themes were identified from the responses.

Results

Overview

The suggestions for potential interventions put forward by the participants were separated into four distinct groups: using small groups for teaching, increasing the amount of numeracy-based classes, explaining the application of numeracy-based knowledge in greater detail and introducing more sympathetic teaching methods. Examples of student responses are presented in italics.

Using small groups for teaching

Undergraduates and postgraduates suggested the use of smaller teaching groups than the class sizes adopted for the lab classes utilised as part of their psychology course (each class had approximately 40 students). The undergraduate participants would have experienced tutorial groups of 6–7 students elsewhere in their course, and these were recommended as models for how the proposed 'statistics groups' would run. The motivation behind the desire for smaller groups seems to be that it would allow the opportunity for more one-on-one teaching from an experienced staff member than would be available in the lab classes. There also appears to be less social stigma about asking for help in a small group than there would be in a fairly large class.

> *It's way easier to learn something in a smaller group. That's why probably in (the smaller) classes it's easier to learn stuff in.* (Undergraduate – female)

> *That would be really good. Groups of ten just with their personal tutor with a computer, who goes through things.* (Postgraduate – female)

The undergraduates suggested that having access to a single individual whose task was to help students with their statistics would reduce anxiety. It was pointed out to the students that the university did run 'stats clinics' for those students with particular problems. The response to this was that such 'clinics' were extremely generalised, having

to cater for a wide variety of disciplines, and so were often not useful for answering the psychology students' particular problems.

> *The idea of a personal tutorial or something like that would be brilliant, just to have that opportunity to raise questions.* (Undergraduate – female)

Approach of the lecturers

Both groups suggested that the teaching style of quantitative lectures could be changed to reduce anxiety. Comments indicated that the current lectures appeared dry and potentially intimidating and that making them more accessible would help. Also, active steps by the lecturer to assuage each student's fears were recommended.

> *Make it fun, yeah. That's a big one. And make sure the lecturer says: 'Please don't panic. This is not going to be as bad as it sounds.'* (Undergraduate – male)

The postgraduates also stressed the importance of lecturers combining both theoretical and practical elements into a single class, as opposed to having the two separate.

> *They do all the theory stuff in the lecture and when it comes to the lab class it's just how to press buttons and that sort of thing, whereas when you combine the two in the one class it really is possible to have…a positive learning experience for people to do statistics.* (Postgraduate – male)

Increasing the amount of maths exposure

Participants stated that increased exposure to numeracy would reduce student fear of it. This could be in the form of additional quantitative lectures/classes, homework to do after each lecture/class and additional practice exams throughout the year.

> *Increase practicals, increase exposure to maths. Don't just make it a one-off, one-semester and one-a-week… Just repeated exposure to it. I think that would take away a lot of the anxiety. For me anyway.* (Undergraduate – female)

Explaining the application behind numeracy

Both groups posited that anxiety towards the numeracy-based component of the course could be reduced if the quantitative component could be rendered less abstract and more applicable to real-world examples.

> *Instead of just telling you the formula and how to get it done I think it would be nicer and easier just to break it down and go like, you know, 'Why are we using this set of numbers?'* (Undergraduate – male)

> *I think…just making sure that it's more practically applicable and not…always just, 'OK we're just going to do this exercise,' and not sort of understand how that could work in the thesis project or whatever.* (Undergraduate – female)

Discussion

These responses suggest that any intervention would have to come from the course itself. Participants recommended increased amounts of quantitative tuition, more sympathetic teaching and smaller class sizes. It is necessary, though, to be careful in the interpretation of these findings. Firstly, it should in no way be construed that all of the above are lacking in the psychology department in which testing occurred. Small-class and one-on-one guidance was available and students were given the names of lecturers and postgraduate students who they could contact if they have any queries. Likewise, many quantitative psychology textbooks contain exercises that enterprising students could use as a form of additional tuition, and most staff members do make an effort to teach numeracy in a non-abstract way.

Secondly, it is debatable whether many of the proposed curriculum changes would be welcomed by students as a whole. While students might say that doubling the amount of statistics lectures and introducing homework would help them, the reaction to such changes occurring would be, most likely, negative. It must be remembered that for an intervention to be successful, work must be

put in by the recipient of the intervention as well as by the organisers. Thirdly, there is the issue of practicality. Many of the changes proposed would involve major alterations in course content that could only be initiated from a departmental level.

Additional issues that may have resulted from the focus groups include the fact that the sample of 22 was quite small. Also, social desirability is a potential drawback of focus groups, and so there was always the risk that participants were simply telling the experimenter what he wanted to hear. While it is possible that this may have happened, to a minor degree, the responses do not reflect this.

Study 2 – interventions

The aim of this study was to reduce psychology students' maths anxiety through the use of three different interventions. Additionally, by exploring the efficacy of these different interventions, using a large sample size and rigorous scientific methodologies, it is hoped that the results will assist towards the formulation of larger-scale, more effective interventions in the future.

Undergraduate psychology quantitative methods courses at the UK university in which testing occurred have a clear structure. For the Y1 students, the course begins with the development of fundamental research methods skills; this shifts to basic statistical techniques by the end of the first semester. At the end of the academic year, students are expected to be familiar with means, standard deviations, z-scores, correlations, chi-squared tests and t-tests. In Y2, there is a greater focus on statistical techniques, with students being introduced to one-way and two-way within-subjects, between-groups and mixed methods ANOVAs, linear regressions and factor analyses. For both years, the quantitative methods courses comprise weekly lectures and practical lab classes. All statistics work is carried out on computer (SPSS) and, with the exception of effect-size calculations, students are not expected to undertake calculations manually. Assessment consists of lab reports submitted as coursework and exams that take place at the end of each academic semester.

All interventions follow directly from previous literature and the qualitative results of Study 1. For Study 2, 'increasing the amount of maths exposure' was not followed up because it would have required major changes to the university-set curriculum. Likewise 'making the instructor's teaching methods more reassuring' would have been too difficult to control as an intervention, as each teacher and teaching assistant would have to be trained to be equally as 'reassuring' to the students.

The 'explaining the real-world application' idea for an intervention was adopted for use in this study. Although some previous research (e.g. Wilson, 1999b) has cast doubts upon the utility of 'real-world example' interventions, participants in the focus groups almost unanimously agreed that this would be effective for reducing anxiety. Two different interventions were extracted from the 'small groups teaching' idea for intervention. The first was that students would be split into small groups for their lab-class work, each group with an instructor assigned. It was expected that students would feel less embarrassed about asking for help if they were in a small group, as opposed to being in a class of approximately 40 individuals. The second intervention drawn from the 'small groups teaching' intervention idea was that students would be given the email address of someone in the department they could go to for help if they could not understand the statistics in their classwork. It was expected that this would reduce the embarrassment associated with asking for help in a public setting and allow students to be less fearful of the topic, knowing that there was someone who could assist them.

Overall, it was expected that the interventions will result in reductions in maths anxiety amongst the students, compared to those students who do not receive any intervention. What was less clear, at this stage, was

whether one particular intervention would be more effective than any of the others.

Method

Measures

The maths anxiety subscale of the Fennema-Sherman Mathematics Attitude Scale (Fennema & Sherman, 1976) was employed to measure changes in maths anxiety amongst the participants. The subscale had 12 items and responses were given on a five-point Likert-type scale, where 1 indicated strong agreement and 5 indicated strong disagreement. Half of the items were positively valenced (e.g. I am usually calm during maths tests) and half were negatively valenced (e.g. a maths test would scare me). Reliability coefficients were carried on the baseline Fennema-Sherman maths anxiety scores for the Y1 and Y2 groups. Each coefficient is acceptable (α=.931 (Y1), α=.946 (Y2)). Information on age and gender was also collected.

Participants

Y1 and Y2 undergraduate psychology students, all from the same institution as Study 1, were invited to participate. Both of these groups had to attend compulsory weekly statistics lab classes and it was in this context that testing occurred. For reasons of practicality each lab was held once on each of four different days per week. The student year group was equally divided (based on alphabetical order of surname) among the four days. Three of the classes were designated as intervention groups for this study, with the remaining class assigned as a control group. Y3 students had no such suitable context and so were not approached for testing. Out of a total combined potential sample of approximately 330 individuals, 141 Y1 participants and 105 Y2 participants (about 75 per cent of the total year group) completed all stages of this study and only these participants are included in the analysis. It should be noted that these participant numbers were considerably higher than is normal for many intervention studies of this sort (e.g. Carroll & Gill, 2012; Van Gundy, Morton, Liu & Kline, 2006). Over 75 per cent of participants were female and over 80 per cent were under 21 years of age.

Procedure

Study 2 was split into 3 stages. At the beginning of the first semester (T1) all participants were presented with the Fennema-Sherman maths anxiety measure while in class in order to establish an attitudinal baseline for the entire group. Stage 2 (T2) – the intervention – occurred roughly half-way through the semester. The Fennema-Sherman measure was re-administered at the end of these classes, to explore if the interventions had any immediate effect. Stage 3 (T3) occurred two weeks later. Participants were given the Fennema-Sherman measure for the final time in order to explore if the interventions had any longer-term effect on anxiety.

Interventions

Three different interventions were utilised at T2. Firstly, participants were given a talk by the principal experimenter before they started working on their class assignments ('Talk'). The talk was short (approximately 5–10 minutes) and was specifically related to the topics being studied (z-scores for the Year 1 students, and one-way repeated-measures ANOVAs for the Year 2 students). The experimenter taught the students using real-life examples (e.g. how repeated measures ANOVAs could be used to chart coffee sales in different cafes throughout the university area).

In the second intervention participants were given the email address of the principal experimenter and told that if there was anything about the topic they did not understand or they needed help with, they could contact him ('Email'). The third and final intervention involved additional help being given to students while in class ('Small Group'). During statistics lab classes, the usual procedure is that students can ask for assistance from the lab demonstrator and one or two assistants who are stationed in the

room. For the intervention, the class was split into eight groups, each group being assigned an assistant. Each assistant had experience with the course content and training in how to assist in psychology lab classes.

Results

Y1 and Y2 results will be explored separately. This is because external factors such as course content and experience with the course could result in differences to the pattern of results between the two year groups. A score of 5 in the Fennema-Sherman maths anxiety scale reveals strong maths anxiety while a score of 1 would indicate weak levels of anxiety. A score of 3 would demonstrate moderate levels of anxiety. All analyses were carried out using SPSS.

At T1, mean anxiety scores ranged from 2.74 – 3.16 for the Y1 students, and 2.73 – 3.16 for the Y2 students, depending on experimental group. Twenty-three Y1 students (16.3 per cent) and 21 Y2 students (20 per cent) indicated mean anxiety levels of 4 and above at T1, indicating very strong levels of anxiety towards numeracy. Figures 1 and 2 show that, for both Y1 and Y2 students, anxiety seems to spike at T2, immediately after the intervention, before decreasing to roughly equal or slightly below the score at baseline at T3. The exception to this was the talk intervention group, whose anxiety decreased post-intervention for the Y1s, and stayed roughly the same for the Y2s. Figures 1 and 2 show how maths anxiety scores change across from T1 to T3.

Mixed ANCOVAs were used to identify whether or not there was a significant main effect of week of testing and intervention on the Fennema-Sherman scores. In each case, time of testing was the repeated measures independent variable (with two levels: T2 and T3), while intervention type was the independent groups independent variable. Post-intervention Fennema-Sherman subscale scores were the dependent variable while participant scores at T1 were used as the covariate in each case. The use of ANCOVAs, as opposed to mixed ANOVAs, was deemed necessary due to unexpected differences in the T1 anxiety scores across the different intervention groups. It was hoped that covariate analysis would allow accurate comparisons to be made between how each testing group responded to the different interventions, allowing for the varied T1 scores.

An independent groups main effect was found for the Y1s, with there being a small but significant main effect of intervention on anxiety score (F (3, 136) =3.470, p=.018; η2

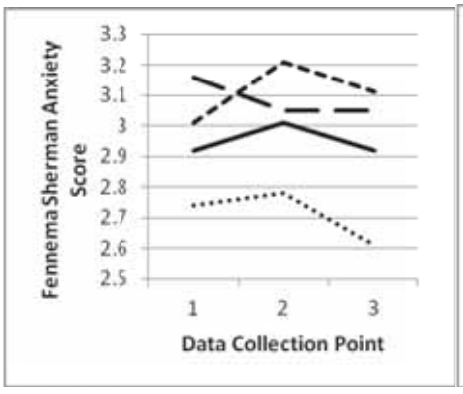

Figure 1. Intervention effects on Maths Anxiety (Y1)

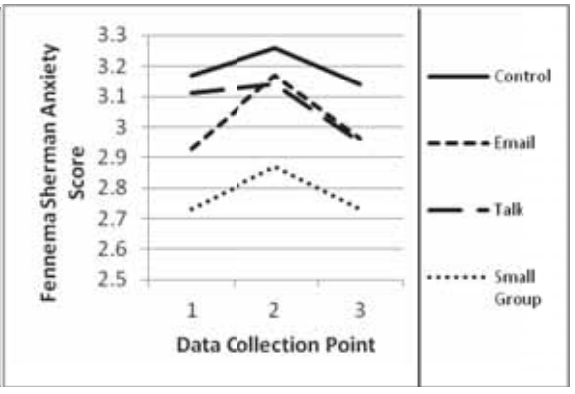

Figure 2. Intervention effects on Maths Anxiety (Y2)

=.0712). Pairwise comparisons found that these differences primarily occurred between the email and talk interventions (with the talk condition resulting in less anxiety) (p=.027). For the Y2 students, the mixed ANCOVAs found no significant main effect of intervention between any of the groups. Figures 3 and 4 show the mean anxiety scores for the groups, at T2 and T3, adjusted for the covariate (T1 scores).

The Email condition was the least effective of the three interventions, possibly having a short-lasting *negative* impact. Anxiety increased from T1 to T2, before decreasing back down to roughly baseline levels at T3. As the anxiety levels in the control group seem to follow an almost identical pattern to the email group it is possible that these findings are simply reflecting the fact that students get more anxious as the course

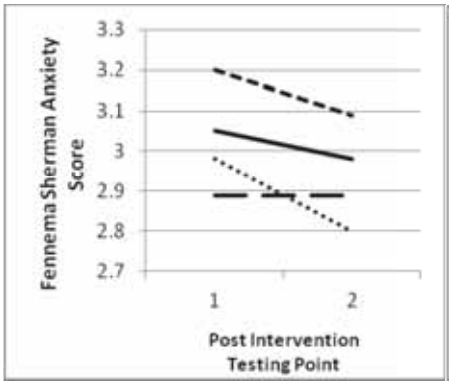

Figure 3. Intervention effects (adjusting for covariate) on Maths Anxiety (Y1)

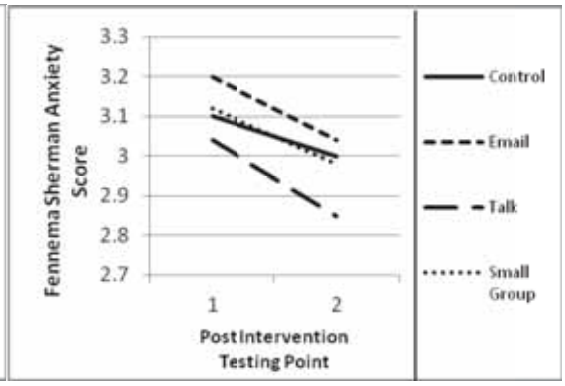

Figure 4. Intervention effects (adjusting for covariate) on Maths Anxiety (Y2)

Discussion

Descriptive statistics show that there was a definite need for an intervention to be implemented amongst many individuals in this particular sample, with substantial minorities within both year groups strongly agreeing with items that asked whether or not students had high maths anxiety. Although the majority of individuals did not report strong anxiety at T1, only a small minority of students indicated that they did not have maths anxiety at all. This general lack of very strong negativity might go part of the way towards explaining why the interventions were not as effective as was hoped. Improvements were noted in certain areas, particularly for the talk condition, but these were minimal, and it cannot be conclusively said that they were not the result of additional factors, such as the effect of additional teaching time.

goes on and becomes more difficult. It is also possible that, in telling participants that they could contact someone if they were challenged by the material on which they were working, this merely served to accentuate any existing negative affect by drawing attention to it. Wilson (1999a) predicted that this might be an issue with certain types of curricular intervention strategies.

The effect of having a single, contactable individual who can give support to students struggling with numeracy-related issues has not been directly investigated as an intervention before. It is possible that, in this case, as the students knew the experimenter to be a researcher and not a professional tutor, they did not trust him to be a useful source of advice. If students had been given the email address of a known individual working with quantitative methods it is possible that this

intervention might have been more effective.

Of the three interventions explored in this study, the talk condition was the most effective, although the benefits were slight and effect sizes small. For the Y1 students, anxiety decreased at T2 (while this may simply be as the result of chance, it should be noted that, in every other condition, anxiety *increased* at T2), remaining at this level for T3. Adjusting for baseline anxiety scores, the talk group had the lowest level of anxiety post intervention in both year groups (although this was only significant for the Y1s).

It should be considered that this intervention consisted of only a brief supplement to the regular tuition, and the fact that positive effects are observed at all supports the utility of such a method. The concept of using everyday examples and case studies to make quantitative methods less abstract has been championed by previous research (e.g. Everingham et al., 2013; Shull, 2009) and the Study 1 focus groups. The much stronger findings of previous studies reflect the greater resources that were at the disposal of the researchers in these cases. Everingham, Gyuris & Sexton's (2013) study involved major overhauls of the curriculum at the Australian university in which testing occurred. Likewise, Shull (2009) was able to implement semester-long interventions. In comparison, this study merely offered a single, ten minute addendum to a class. It is logical that a more in-depth intervention would produce far more sizeable results than were achieved here.

It is possible that the positive effects produced by the talk intervention may have resulted from the fact that it provided a small degree of extra tuition. Again, the use of extra tuition to improve affect and performance is supported by the literature (e.g. Juhler, Rech, From & Brogan, 1998). Future interventions may seek to replace, as opposed to supplement, aspects of the quantitative methods teaching, to explore the source of the positive effects.

The small group condition had some effect on anxiety ratings, but to a very small degree. The changes in anxiety for this condition were similar to that in the control and email groups. Adjusting for the baseline scores, the post-intervention small group participants were less anxious than the controls, but not significantly. Unfortunately, no previous research has examined the effect of having larger numbers of teaching assistants in numeracy-based classes. In the present study it is possible that students viewed the increased number of assistants as a 'crutch' that they could avail themselves of to help them get their compulsory class exercises finished, as opposed to a resource they could use to help further their understanding of the numerical concepts involved.

There are other possible explanations why the interventions had only limited effectiveness. Firstly, there was a disparity between the intervention groups for both Y1 and Y2, in terms of class size and general class attitudes. As described earlier, lab classes are allocated on the basis of alphabetical order, and swapping between classes is generally not allowed. As a result of these precautions, there should have been no significant differences between groups. As can be seen from Figures 1 and 2, differences nevertheless existed. While the effect of the varying attitudinal baseline was countered for by the ANCOVAs, it cannot be ruled out that this had a negative influence on the study.

Also, it could be argued that the topics chosen for the interventions were not sufficiently challenging and that the intervention should have been focused on some of the quantitative topics with which students have the greatest difficulty. Unfortunately the study, with three data collection points per year group, had to be fitted around the course syllabus, and so the choice of topics for the intervention condition had to reflect their position in the semester as well as their difficulty. A more effective future intervention would be formulated along with the course syllabus, to allow greater flexibility. It must be noted though, that the majority of

students appeared to find the selected topics challenging, and so it is possible that no significant advantage would be gained from focussing on different topics.

General discussion and conclusion

While the results from this research are fairly weak, valuable implications can be drawn. Firstly, all the interventions presented here were formulated independently to the course curriculum, and were run as addendums as opposed to being part of the course. Student focus group responses, however, indicate that, for an intervention to be truly effective it has to initiate from changes made to the course itself. Specifically, this could involve alterations in the format of the classes, the attitudes and methods of the teachers, and the way in which the course information is presented to students. Adding something 'extra' to a set curriculum is not going to make any significant change.

The talk intervention was the most effective of the three methods used in Study 2. However, it is unclear whether this was as a result of the use of everyday, non-abstract examples, or whether it was as a result of the additional tuition afforded to the students. The future exploration of both these avenues would be advantageous. Both are supported by previous literature (e.g. Juhler et al., 1998; Renzulli, 2000) and both were strongly endorsed by the students themselves. It is clear though that, to be significantly effective, any intervention focused on these topics would have to be on a much more substantial scale than the brief talk students received here. In conclusion, this research has shown potential ways forwards for future intervention studies. A need for further interventions exists, and it seems likely that greater efforts to focus on real-life examples in quantitative methods teaching would yield fruitful results.

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