Evaluation of a Workshop to Reduce Negative Perceptions of Statistics in Undergraduate Psychology Students

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Abstract

We evaluated whether a brief group workshop that combined psycho-education and learning strategies improved self-efficacy, attitudes, and anxiety regarding statistics in psychology students. The workshop was completed in Week 1 of a compulsory 1st-year psychology statistics course. Prior to the workshop, the attendees (n = 10) did not differ from the non-attending control group (n = 17) on statistics self-efficacy, attitudes, or anxiety. These measures were re-assessed after the workshop near the end of semester (Week 10). Workshop attendance resulted in significantly higher self-efficacy, computational self-concept, and attitudes regarding the worth of statistics, and less fear of statistics teachers. It did not change statistics anxiety. Participants evaluated the workshop as useful, especially the information on effective learning strategies. The results demonstrate that a brief and cost-effective group intervention can improve self-efficacy and attitudes regarding statistics. Improvements to better target anxiety are discussed.

**Key Words:** statistics self-efficacy; statistics attitudes; statistics anxiety; statistics teaching; anxiety reduction
Evaluation of a Workshop to Reduce Negative Perceptions of Statistics in Undergraduate Psychology Students

Psychology students often have negative perceptions of statistics, which can interfere with achievement (Finney & Schraw, 2003; Tremblay, Gardner, & Heipel, 2000). Compounding this issue, students generally complete several statistics courses in their undergraduate degrees (e.g., American Psychological Association, 2007; Australian Psychology Accreditation Council, 2010; British Psychological Society, 2012). One problem is that many do not see the relevance of statistics to their degree program or future profession. At the start of their degree, 40% of undergraduate psychology students did not even know that psychology included statistics (Ruggeri, Diaz, Kelley, & Papousek, 2008). When students fail to see the real-life relevance of statistics, they focus more on assessment than on learning and this increases anxiety (Onwuegbuzie, Da Ros, & Ryan, 1997). This paper reports on a brief workshop designed to reduce a range of negative perceptions toward statistics.

Negative perceptions include negative attitudes, anxiety, and low statistics self-efficacy. Of these, statistics anxiety has been examined most extensively. Social science students describe statistics courses as the most anxiety provoking in their degree, with up to 80% reporting high levels of statistics anxiety (Onwuegbuzie & Wilson, 2003; Zeidner, 1991). Anxiety interferes with learning and achievement by taking working memory resources and attention away from task-relevant processing (Ashcraft & Kirk, 2001). As a result, students feel confused and unable to focus, attributing this to poor ability (Ashcraft & Kirk, 2001), which may manifest as low self-efficacy (Pajares, 2002). Low self-efficacy, in turn, results in high anxiety for future performance on similar tasks (Zohar, 1998) and impairs learning and achievement (Onwuegbuzie et al., 1997; Onwuegbuzie & Wilson, 2003). In addition, students can experience negative attitudes such as not valuing statistics, fearing
statistics teachers, having poor self-concepts, and seeing statistics as difficult (Chiesi & Primi, 2010; Cruise & Wilkins, 1980).

Galli, Ciancaleoni, Chiesi, and Primi (2008) showed that negative perceptions of statistics precede poor performance. Psychology students who failed an introductory statistics course already reported negative statistics attitudes at the start of semester. These attitudes did not improve over the semester. They also reported higher anxiety mid-course before they had experienced objective failure. By comparison, those who passed began with positive attitudes, which further improved over the semester.

Various intervention approaches have been examined to address the negative perceptions that students have towards statistics. However, most interventions have focused on reducing statistics anxiety at the neglect of other negative perceptions. Some approaches focus on teaching and assessment strategies including open book exams, working with another student in lab classes, using real world examples, adapting instructional pace to student needs, and the instructor having a positive interpersonal style (Neumann, Hood, & Neumann, 2009; Pan & Tang, 2005; Schacht & Stewart, 1990; Wilson, 1999). Another approach has been to apply general anxiety interventions. Acceptance and commitment therapy and systematic desensitisation have been found effective in reducing maths anxiety (Zettle, 2003). Kranzler (2003) advocated rational emotive therapy in which students identify and replace irrational beliefs and use mastery or coping imagery. EncStat (Watson, Lang, & Kromrey, 2002) is a multimedia program based on cognitive behavioural therapy that is designed to reduce statistics anxiety and negative attitudes. However, the effectiveness of these various approaches has not been evaluated against suitable control groups.

The present study had two aims. First, to describe a brief, cost-effective workshop designed to improve statistics self-efficacy and attitudes and reduce anxiety in undergraduate psychology students. The workshop was designed for students with subclinical but above
average negative attitudes and anxiety. Second, to collect pilot data on the effectiveness of
the workshop in improving statistics self-efficacy and reducing statistics anxiety and negative
attitudes. Unlike prior studies, workshop participants were compared with a matched control
group. If the workshop positively influences students’ perceptions, attendees would be
expected to show improved statistics self-efficacy and attitudes and reduced anxiety post-
workshop compared to the control group.

Method

Description of the Course

The research methods and statistics course is a core first-year course in the
undergraduate psychology program at a regional Australian university. Over the semester,
students attend 13 weekly 2-hour lectures and 12 weekly 2-hour tutorials. The course covers
research methods, descriptive statistics, correlation, probability, sampling distributions,
confidence intervals of the mean, and hypothesis testing using \( t \)-tests. The SPSS statistical
software package and APA style report writing (American Psychological Association, 2010)
are taught.

Description of the Workshop

The workshop was based on Bandura’s (1977) argument that all successful anxiety
reduction treatments increase self-efficacy or competence in mastering a feared situation.
Students with higher self-efficacy are more likely to attempt tasks than to avoid them, to
expend more effort, and to persist in the face of challenge, all of which are related to better
learning outcomes (Bandura, 1977). The 2-hour workshop incorporated self-reflection,
psycho-education, instruction in effective learning strategies, and goal setting. Workshops
were conducted with small groups (maximum 13 students) at the end of Week 1. The
workshops were conducted by the course tutors (paid graduate psychology students).
The workshop first aimed to clarify, normalise, and appropriately situate students’ concerns about statistics. The workshop next focused on effective strategies to strengthen statistics self-efficacy, improve attitudes, and reduce anxiety as well as on helping students’ identify their own learning style and develop strategies to suit that style. The workshop concluded with students formulating specific goals and plans for enhancing their engagement and performance in the statistics course.

After initial introductions and rapport building, students shared their perceptions of statistics. This allowed them an opportunity to voice their concerns and to normalise them by realising that they were not alone in feeling that way. Concerns were listed on a whiteboard and categorised into emotional, cognitive, or behavioural reactions. To further normalise their feelings, students were informed of published research about the high percentage of social sciences students that experience negative attitudes and anxiety about statistics (Onwuegbuzie & Wilson, 2003; Zeidner, 1991). Such references to the results of previous studies, illustrated by simple descriptive statistics, served to introduce students gently to the purpose of statistics, which is to answer real world practical questions (e.g., How many students get anxious about doing statistics?). Mathematical computation was de-emphasised. This was designed to foster an attitude that it is worthwhile for psychologists to understand statistics. Humour was used throughout (e.g., “Whoops, did you notice that you were doing statistics again just then!”), based on evidence that humour reduces anxiety (e.g., Neumann et al., 2009).

In the psycho-educational component, statistics anxiety and its characteristics were defined and related back to the emotions, cognitions, and behaviours that participants had initially nominated. Empirical evidence regarding the main predictors of statistics anxiety, including situational (e.g., lack of maths background), personal (e.g., gender stereotypes), and
dispositional (e.g., poor statistics self-efficacy) factors, was presented to dispel myths (e.g., I need to be good at maths to do statistics) and facilitate cognitive restructuring.

Next, effective learning strategies were covered, including:

1. Facing, not avoiding statistics, especially formulae (e.g., writing out what a formula means in lay terms to understand it)
2. Talking the talk: using statistical language so it becomes familiar and less threatening
3. Forming study groups for support
4. Focusing on the real-world applications not on the computational formulae (e.g., look for ways to apply statistical concepts to everyday situations)
5. Avoiding procrastination (e.g., doing a little statistics every day, attending all classes).

Procrastination is related to negative attitudes, statistics anxiety, and poorer performance (Jiao, Da Ros-Voseles, Collins, & Onwuegbuzie, 2011; Onwuegbuzie, 2004). Statistics students particularly procrastinate on completing weekly text readings, commencing written assignments, and studying for exams (Jiao et al., 2011; Onwuegbuzie, 2004).

6. Being prepared (e.g., pre-reading the textbook to reduce anxiety during the lecture, thereby maximising the allocation of cognitive resources to processing lecture content)
7. Seeking help early from staff
8. Keeping it in perspective: focusing on long-term goals in psychology for which statistics courses are needed.

Learning styles (visual, auditory, and tactile/kinaesthetic) and strategies to match were introduced next. Improving students’ learning strategies was expected to improve their statistics self-efficacy and, thereby, their attitudes and anxiety. Rodarte-Luna and Sherry (2008) suggested that instruction in learning strategies might reduce statistics anxiety by providing a means of cognitive restructuring, although they did not test this. Onwuegbuzie (1998) found that multiple aspects of learning styles/strategies predicted research anxiety in
teacher education students, accounting for around a third of the variance in that anxiety. Thus, he recommended a multimodal approach to reduce anxiety. West, Kahn, and Nauta (2007) also recommended that a multimodal approach would improve research self-efficacy and interest in graduate psychology students. In the current workshop, we presented a range of strategies using a mixture of auditory, visual and kinaesthetic learning styles (adapted from Humboldt, 2008; Sadker & Zittleman, 2006). Examples are:

1. Auditory: learning by listening; talking about/explaining content to others
2. Visual: using diagram/models/concept maps; using interactive statistical applets to visualise concepts
3. Tactile/kinaesthetic: doing the computer-based statistical analyses in tutorial classes rather than watching someone else do them; rewriting/retyping notes so physically engaged.

Finally, students were encouraged to write down three specific goals or plans that they would enact to increase their engagement in the course, improve their confidence, and reduce their anxiety.

**Evaluation of the Workshop**

Students completed measures of statistics anxiety and attitudes (Statistics Anxiety Rating Scale, STARS; Cruise & Wilkins, 1980) and self-efficacy (Statistics Self-efficacy Scale, SSES; Bandalos, Finney, & Geske, 2003). The first author (who was not involved in teaching this course) instructed the students in self-scoring the STARS scale and provided means from previous research (Hanna, Shevlin, & Dempster, 2008). For ethical reasons, any student that wished to could participate in the workshop; however, only students that scored above average on the STARS were included in the evaluation study. In addition, ethical reasons prohibited random allocation of students to participate in the workshop. For this reason, students that scored above average on the STARS but who did not attend the workshop functioned as the control group. The researchers were blind as to who participated.
At the end of the workshop in Week 1, attendees qualitatively evaluated it. Post-workshop measures on the same scales were completed during the Week 10 lecture.

**Participants**

Pre-workshop measures were completed by 112 students. Of those, 56 were in the target category (above average STARS scores). Of those, 17 voluntarily attended the workshop (attendees) and the remaining 39 formed the control group (non-attendees). In Week 10, 10 workshop attendees and 17 non-attendees completed the post-workshop measures, representing retention rates of 58.82% and 43.59%, respectively. Table 1 presents demographic details. Attendees and non-attendees did not differ significantly on any of these variables, \( p_s > .05 \).

**Measures**

The 10-item SSES (Bandalos et al., 2003) assesses perceptions of statistical self-efficacy (e.g., “I think I am naturally good at statistics”) on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). The wording of some items was changed to reflect the specific course (e.g., replaced “statistics” with “research methods and statistics”). Higher scores indicated greater statistics self-efficacy. Bandalos et al. (2003) reported high reliability (Cronbach’s \( \alpha = .95 \)). The current sample (based on total Week 1 data, \( N = 112 \)) yielded an alpha of .93.

The STARS (Cruise & Wilkins, 1980) has 51 items. The first 23 ask students to rate their anxiety in statistics situations (e.g., “Enrolling in a statistics course”) from 1 (no anxiety) to 5 (considerable anxiety). These yield subscale scores for test/class anxiety (8 items), interpretation anxiety (11 items), and fear of asking for help (help-seeking anxiety, 4 items). The remaining 28 items assess attitudes (e.g., “Statistics is a pain I could do without”) using a 5-point Likert response format from 1 (strongly disagree) to 5 (strongly agree). These
yield worth of statistics (16 items), fear of statistics teachers (5 items), and computational self-concept (7 items) subscale scores. Higher scores on all subscales indicate higher anxiety or negativity. Some wording was modified to reflect the cultural context (e.g., “professor” was changed to “lecturer”). Previous studies have confirmed the 6-factor structure (Hanna et al., 2008) and reported adequate validity and subscale internal reliabilities (.64 - .94; Hanna et al., 2008; Watson et al., 2002). We obtained high subscale reliabilities (Cronbach’s $\alpha$s) based on the full Week 1 sample: test/class anxiety (.87), interpretation anxiety (.88), help-seeking anxiety (.85), worth (.91), fear statistics teachers (.78), and computational self-concept (.88).

Participants also reported age, gender, degree, enrolment (part or full-time), student status (domestic or international), whether maths was taken in secondary school, and their tertiary entrance score.

Attendees completed a questionnaire to evaluate five aspects of the workshop (see Table 3) on a 7-point scale from 1 (Not at all useful) to 7 (Extremely useful). This demonstrated good internal consistency (Cronbach’s $\alpha = .83$). In addition, two open-ended questions assessed the most and least useful part of the workshop, and recommendations for changes.

**Results**

Table 2 shows the descriptive statistics. There were no significant differences between Attendees and Non-attendees at Week 1, although the difference on self-efficacy approached significance. This trend was for attendees to have lower self-efficacy than non-attendees.

INSERT TABLE 2 ABOUT HERE

Less than 5% of participants’ data were missing and were missing at random (Little & Rubin, 1987). Mean replacement was used. An $\alpha$ of .05 was used for all analyses. Degrees of freedom were adjusted to account for any heterogeneity of variance (Welch, 1947).

**Attrition Analysis**
Attendees (41.2%) and Non-attendees (56.4%) did not differ on attrition rate, $p > .05$. Almost half of the attrition (41.4%) was due to students dropping the course in which the study was conducted; 17.65% Attendees and 25.64% Non-attendees, $p > .05$. There were no significant differences between those who dropped out from either group on pre-workshop measures or demographic variables, $ps > .05$.

**Pre-Post Change in Statistics Attitudes, Anxiety, and Self-Efficacy**

Separate 2 (Time; Pre vs. Post) x 2 (Attendance; Attendee vs. Non-Attendee) ANOVAs were conducted for each dependent variable. There was a significant interaction of Time x Attendance on statistics self-efficacy, $F(1, 25) = 5.82, p = .02, \eta^2_p = .19$. Attendees had marginally lower statistics self-efficacy than Non-Attendees pre-workshop, $t(25) = 2.05, p = .051$. From pre- to post-workshop, statistics self-efficacy increased in the Attendees and decreased in the Non-attendees, resulting in similar levels of self-efficacy post-workshop, $p = .80$ (Figure 1a, Table 2).

There was also a significant Time x Attendance interaction on worth of statistics, $F(1, 25) = 4.56, p = .04, \eta^2_p = .15$. From pre- to post-workshop, negative attitudes regarding the worth of statistics decreased in the Attendees, $F(1, 9) = 5.28, p = .047, \eta^2_p = .37$, but did not change in the Non-attendees, $p = .79$ (Figure 1b; Table 2).

There was also a significant interaction effect on computational self-concept, $F(1, 25) = 4.64, p = .04, \eta^2_p = .16$. Negative attitudes regarding computational self-concept decreased significantly in the Attendees, $F(1, 9) = 9.38, p = .014, \eta^2_p = .51$, but did not change in the Non-attendees, $p = .07$ (Figure 1c; Table 2).

Fear of statistics teachers decreased significantly over time in the Attendees, $F(1, 9) = 12.08, p = .007, \eta^2_p = .57$, but not the Non-Attendees, $p = 1.00$ (Figure 1d; Table 2). However, the Time x Attendance interaction failed to reach significance, $F(1, 25) = 3.84, p =$
.06, $\eta_p^2 = .13$. There were no significant interaction effects on test/class, interpretation, or help-seeking anxiety, $p$s = .54, .77, and .16, respectively.

There was a significant attendance main effect on test/class anxiety, $F (1, 25) = 7.80$, $p = .01$, $\eta_p^2 = .24$. Attendees had significantly lower test/class anxiety than did Non-attendees when averaged across the two times (Table 2). There were significant time main effects on both interpretation anxiety, $F (1, 25) = 16.98$, $p < .001$, $\eta_p^2 = .40$, and help-seeking anxiety, $F (1, 25) = 4.35$, $p = .05$, $\eta_p^2 = .15$, with both groups showing significant decreases over time (Table 2).

**Participant Evaluation of the Workshop**

Participants rated each aspect of the workshop as useful, shown by all mean scores above 5 out of possible 7 (Table 3). Tips and strategies were rated as most useful. Consistent with this, on the open-ended questions, 60% of the participants referred to information on different learning styles and strategies as most useful (e.g., “The most useful part was the different types of strategies”). The second most common comment (40%) referred to confidence building and allaying their fears about doing statistics (e.g., “Interpreting statistical data at the beginning of the workshop, i.e., a small amount of stress/anxiety is good, shows that stats isn’t that bad”). Two participants referred to normalising statistics anxiety (e.g., “Definitely the reassurance that there are some other people like me!”). There were three other comments, each made by one participant: provision of materials (“Hand out sheet”), opportunities to ask questions (“Being able to ask questions early on was good as well”), and helpfulness of staff (“Also even the thought that the lecturers, tutors put effort into constructing this class shows me that there is help available”). For comments on what was least useful in the workshop, the most common categories were information on the
prevalence of statistics anxiety (40%), that no statistical content was covered (20%), and information on learning styles (20%).

**Discussion**

Negative perceptions about statistics are widespread problems for psychology students. However, there has been limited research on interventions to improve these perceptions. The present study described a brief group workshop that aimed to improve perceptions regarding statistics. In addition, an evaluation of the workshop indicated that it was of benefit to the students. Workshop attendance resulted in significantly higher statistics self-efficacy and computational self-concept and worth attitudes and significantly lower fear of statistics teachers. While there were also main effects of group on test/class anxiety and of time on interpretation and help-seeking anxiety, these could not be specifically attributed to the workshop.

The workshop contained several elements that were designed to improve negative attitudes towards statistics. It aimed to improve statistics self-efficacy by imparting effective learning strategies. It also provided immediate success experiences by engaging students in the application of statistics to real-world questions. The present finding indicated, as expected, that the workshop improved statistics self-efficacy. The workshop also emphasised that the statistics course was less about mathematical computation and more about understanding formulae and using computer programs for computations. Everyday statistical concepts (e.g., means) were introduced in words and converted to the mathematical formulae so students could understand what the formulae stood for. They were encouraged to write out formulae in lay terms, use statistical language, and focus on answering real-world questions rather than on the computations. The results indicate that this was successful in improving computational self-concept. Emphasising and demonstrating the usefulness of statistics in
answering real questions was also relevant to the observed improvements in attitudes regarding the worth of statistics. Finally, providing this workshop and using the course tutors to deliver it, with humour, conveyed to students that the staff did appreciate their concerns and wanted to assist, thereby, contributing to a reduction in their fear of statistics teachers.

All students in the study improved over the semester on interpretation and help-seeking anxiety. The effect of time on interpretation anxiety was strong, explaining 40% of the variance. Thus, simple exposure to statistics over the semester in a supportive teaching environment appears sufficient to decrease students’ interpretation and help-seeking anxiety. It is also likely that the workshop had stronger effects on statistics self-efficacy and attitudes because these were the focus of the workshop.

There was some individual variability in what participants perceived as useful in the workshop. Despite information on learning styles and strategies being most commonly noted as useful, participants who felt that they had already developed effective study strategies saw that as least useful. Similarly, for some students, realising that they are not alone in their anxiety is a relief; for others, hearing about the widespread nature of statistics anxiety exacerbates their own anxiety and is not helpful. In future workshops, we recommend increasing the focus on effective strategies and minimising the reference to statistics anxiety. Inclusion of more specific anxiety reduction strategies, such as deep breathing, progressive muscle relaxation, and coping imagery techniques (e.g., visualising successfully working through statistics problems) is also recommended.

A strength of the present study was the use of an equivalent comparison group, which allowed stronger conclusions regarding whether the observed changes were specific to the workshop rather than to general teaching or student experiences within the course. Appropriately matched control groups are generally absent in prior research into reducing statistics anxiety (e.g., Neumann et al., 2009, Pan & Tang, 2005; Schact & Stewart, 1990,
Wilson, 1999; Zettle, 2003). However, we did not control for the effect of simply being exposed to the course tutors for this additional 2 hours. It could be argued that this caused the reduction in fear of statistics teachers. However, it would be unlikely that it could explain the between-group differences in statistics self-efficacy, computational self-concept, and worth. Specific comments made in the evaluation regarding the usefulness of the learning strategies and styles also suggest that the observed benefits derived from the workshop content rather than the opportunity to meet the tutors. However, future research would benefit from including a second control group who are exposed to the tutors for a similar time but are not given the content.

There were some limitations due to the current study being conducted as a component of a real course. The sample size was small, thereby limiting statistical power. However, the fact that we obtained several significant and moderate-sized effects despite limited power indicates that those results are robust. A second limitation was that it was not ethically or practically possible to allocate students randomly to workshop or comparison groups and compel them to attend. Pre-workshop analyses established that there were no significant between-group differences but it is possible that attendees were more highly motivated toward their study or to change their perceptions about statistics, which we did not measure. Future research should measure this to determine whether motivation is related to voluntarily attending such interventions and to the outcomes. In addition, all of our workshop attendees were women. Approximately 80% of the students in the course were women, so this is not necessarily surprising. However, none of the men in the target group (6%) attended. Gender differences in help seeking for statistics anxiety needs further exploration. Most existing research has been conducted using social science or education students, where there are substantially more women than men (e.g., Onwuegbuzie, 2000 had 91.2% women; Zettle, 2003 had 83.3%). Thus, we currently know less about statistics anxiety and its treatment in men.
In conclusion, this pilot study shows that a brief and cost-effective group workshop delivered at the start of semester can produce identifiable improvements in statistics self-efficacy and attitudes. We suggest that to reach students, including men and those with test/class anxiety, who do not voluntarily attend workshops, this content could be embedded in weekly classes or delivered online. Further, we recommend giving less emphasis to the widespread nature of statistics anxiety and more to strategies, including those for reducing anxiety, although research is needed to determine if that would produce better outcomes.
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**Author Biographies**

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Figure 1. Effect of workshop in improving mean self-efficacy (a), worth of statistics (b), computational self-concept (c), and fear of statistics teachers (d). Error bars represent standard errors of the means.
Table 1

Demographic Details for the Workshop Attendees and Non-attendees

<table>
<thead>
<tr>
<th>Variable</th>
<th>Attendees $(n = 10)$</th>
<th>Non-attendees $(n = 17)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female : Male Ratio (%)</td>
<td>100 : 0</td>
<td>94.1 : 5.9</td>
</tr>
<tr>
<td>Mean Age (years; $SD$)</td>
<td>20.10 (5.47)</td>
<td>19.24 (1.95)</td>
</tr>
<tr>
<td>Tertiary Entrance score $^a$</td>
<td>8.40 (4.27)</td>
<td>12.29 (4.97)</td>
</tr>
<tr>
<td>Enrolment status (% domestic students)</td>
<td>100</td>
<td>82</td>
</tr>
<tr>
<td>Completed secondary school math (%)</td>
<td>70</td>
<td>76</td>
</tr>
</tbody>
</table>

$^a$ Tertiary entrance scores range from 1 = highest to 25 = lowest aptitude for tertiary study.

Admission to a Psychology program at the university generally requires a score of 16 or less.

Tertiary entrance scores were only available for 14 non-attendees.
Table 2

*Descriptive Statistics (range, Mean, and SD) for Statistics Self-efficacy, Anxiety, and Attitudes*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Possible Range</th>
<th>Week 1</th>
<th>Week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attendees</td>
<td>Non-attendees</td>
<td>Attendees</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>10 - 70</td>
<td>30.60</td>
<td>37.65†</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.85)</td>
<td>(9.46)</td>
</tr>
<tr>
<td>Test/class anxiety</td>
<td>8 - 40</td>
<td>27.40</td>
<td>30.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.04)</td>
<td>(3.41)</td>
</tr>
<tr>
<td>Interpretation anxiety</td>
<td>11 - 55</td>
<td>34.70</td>
<td>36.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.31)</td>
<td>(5.02)</td>
</tr>
<tr>
<td>Fear help-seeking</td>
<td>4 - 20</td>
<td>11.00</td>
<td>12.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.36)</td>
<td>(2.76)</td>
</tr>
<tr>
<td>Worth of statistics a</td>
<td>16 - 80</td>
<td>43.70</td>
<td>42.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.38)</td>
<td>(7.72)</td>
</tr>
<tr>
<td>Fear statistics teachers a</td>
<td>5 - 25</td>
<td>11.90</td>
<td>11.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.07)</td>
<td>(3.22)</td>
</tr>
<tr>
<td>Computation self-concept a</td>
<td>7 - 35</td>
<td>26.60</td>
<td>22.47†</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.88)</td>
<td>(5.35)</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

† p < .06

*higher scores = more negative attitudes*
Table 3

*Descriptive Statistics for Workshop Evaluation*

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing that most students experience some anxiety about statistics courses</td>
<td>5.40 (1.17)</td>
<td>4 - 7</td>
</tr>
<tr>
<td>2. Having an opportunity to express my concerns</td>
<td>5.20 (1.13)</td>
<td>3 - 6</td>
</tr>
<tr>
<td>3. Tips for beating statistics anxiety</td>
<td>5.60 (0.84)</td>
<td>5 - 7</td>
</tr>
<tr>
<td>4. Strategies for approaching statistics based on my learning style</td>
<td>5.80 (0.63)</td>
<td>5 - 7</td>
</tr>
<tr>
<td>5. Formulating things I plan to do differently now</td>
<td>5.30 (1.25)</td>
<td>3 - 7</td>
</tr>
<tr>
<td>Total Score (max = 35)</td>
<td>27.30 (3.68)</td>
<td>22 – 33</td>
</tr>
</tbody>
</table>

Note: Scale response format: 1 = *Not at all useful*, 4 = *Unsure*, 7 = *Extremely useful*