In psychological research, the administration of a pretest before an experiment may interfere with the participants’ reactions to the treatment. This effect is known as pretest sensitization. Most often the pretest effect elevates the score on the post test.

Pretest sensitization cannot be detected in the typical two-group experimental design which consists of an experimental and a control group. A design commonly known as the Solomon four-group design provides the opportunity to detect the presence of pretest sensitization. The key element in this design is that two groups, one experimental and one control, receive no pretesting whatsoever.

Morgan has made repeated calls for the application of Solomon's four-group design in exercise psychology research. To our knowledge, these calls have not been heeded. Therefore, the goal of this study was to test for the presence of pretest sensitization in a typical exercise psychology experiment.

Method

Participants

Ninety-three moderately active university students, 54 women and 38 men, with a mean age of 19.8, volunteered to participate. All volunteers were from an undergraduate psychology class and received credit for their participation.

Materials

Subjective Exercise Experience Scale (SEES). The SEES consists of 12 items that measure global psychological responses to the stimulus properties of exercise. These items have been determined to sit on three distinct factors. Two of these factors correspond to the positive and negative poles associated with psychological health, Positive Well-Being (PWB) and Psychological Distress (PD) while the third factor gives subjective indicants of Fatigue.

Self-efficacy. Self-efficacy was assessed by asking participants “how confident are you that you can exercise at a high intensity for 5, 10, 15, 20, 25, and 30 minutes.” They were provided with a scale that ranged from 0% confidence to 100% confidence. The six scores were averaged to obtain the self-efficacy score.

Design and Procedure

Testing occurred in one 45-minute session. Participants were requested not to exercise 24 hours prior to testing as well as not smoke, ingest caffeinated products, or eat 4 hours prior to their appointment.

When participants arrived at the lab, informed consent was obtained and they completed the Physical Activity Readiness Questionnaire (rPAR-Q) to ensure they were not at risk during exercise. The experimenters then recorded the participants’ height, weight, age, and the number of times they exercised during the last 4 weeks.

Based on a randomly ordered list, participants were then assigned to one of four conditions within a Solomon four-group design. No significant differences in participant characteristics existed among the groups.

Pre-post conditions. Participants within these conditions (Groups I & II) completed the baseline measures which were self-efficacy and feeling states. Once completed, the participants assigned to the exercise condition (Group I) were fitted with a heart-rate monitor and were familiarized with the cycle ergometer. The experimenter then proceeded with the PWC 170 fitness test which is a submaximal protocol for estimating VO$_{2\text{max}}$. Once participants completed the fitness test, they completed the post-exercise measures.

Participants in the pre-post control condition (Group II) read exercise related magazines for 12 minutes and then completed the post-condition measures.

Post-only conditions. Once the demographic data was collected, participants assigned to the fitness test (Group III) and control conditions (Group IV) followed the same procedure as above, however, they did not complete the baseline measures.

Participants in the two control conditions (Groups II & IV) were given a fitness test once they completed their post-condition measures and data collection was finished.

Results

In order to test for the presence of pretest sensitization, a 2 X 2 between-groups analysis of variance (Exercise x Pretest) was conducted on the four posttest scores for each outcome including the three subscales of the SEES. A significant interaction between factors would have indicated pretest sensitization.

No significant interaction was observed for either of the dependent variables. However, the main effect of exercise
for Fatigue, PWB, and PD was significant: Those in the exercise condition experienced greater PWB, $F(1, 91) = 14.48, p < .001$, less fatigue, $F(1, 91) = 4.48, p = .037$, and lower PD, $F(1, 91) = 16.28, p < .001$, than those in the control condition. No main effect was observed for self-efficacy ($p = .54$).

### Means (SDs) for the SEES Subscales and Self-Efficacy by Group (N = 23 for each group)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Group IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>SEES_PWB</td>
<td>5.13 (1.04)</td>
<td>5.76 (0.86)</td>
<td>4.91 (1.09)</td>
<td>5.17 (1.13)</td>
</tr>
<tr>
<td>SEES_PD</td>
<td>1.59 (0.71)</td>
<td>1.23 (0.34)</td>
<td>1.96 (0.94)</td>
<td>2.02 (1.06)</td>
</tr>
<tr>
<td>SEES_Fatigue</td>
<td>3.16 (1.40)</td>
<td>2.77 (1.22)</td>
<td>3.12 (1.26)</td>
<td>3.07 (1.49)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>76.00 (18.07)</td>
<td>77.93 (18.40)</td>
<td>78.62 (16.44)</td>
<td>78.96 (15.82)</td>
</tr>
</tbody>
</table>

**Comments**

We found no indication of pretest sensitization when testing for the effect of acute exercise on feeling states or self-efficacy. However, we do encourage other exercise psychology researchers to use the Solomon four-group design in their work.

**Chris Blanchard, MA, and John C. Spence, PhD**

**References**


