Ain't that a shame: An exploration into "academic" shame and STEM learning

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Abstract

The current study explored the impact that "academic" shame had on learning of the human circulatory system. Participants were randomly assigned to one of two conditions: a shame induction condition or a control condition (no shame induction). Results revealed that the shame induction manipulation was related to higher levels of state shame. Additionally, it was discovered that by and large "in the moment" shame and having a proneness to experiencing shame dampened down any subsequent learning. Implications to education and future research are discussed.

Keywords: shame; cognition; learning; STEM; emotions

Theoretical Framework

Although there are many ways to define shame, for the purposes of this study, shame is an acutely painful affective state that is brought on by a failure to meet internally set rules, ideals, goals, or standards (Turner, Husman, & Schallert, 2002). A gap currently exists in the literature regarding a quantitative exploration of shame. Of the research that has been conducted, much has been qualitative in nature and not focused on "academic" shame (i.e., shame affiliated with learning and education). One possible reason for the underdeveloped exploration of this construct is due to the difficulty in studying it. More specifically, research has shown that individuals may deny their feelings of shame, they tend to self-isolate when they feel shame, and they may be unwilling or unable to express themselves when they feel shame. In fact, one's difficulty in communicating a shameful experience may be a distinctive characteristic of shame (Turner, 2014; Babcock & Sabini, 1990, Lunde, 1958).

Although research has suggested the *difficulties* in studying shame, the difficulty does not detract from the *importance* of studying shame. Tangney and Dearing (2002) suggested that, "Guilt, and especially shame ... are powerful, ubiquitous emotions that come into play across most important areas of life." (p. 8). Contemporary research has shown that experiences of shame can have a "negative impact on interpersonal behavior and functioning" (Tangney & Dearing, 2002, p. 5). Within the context of education, a number of educational psychologists have asserted that feeling shame can interfere with motivation, and negatively impact students' academic goals and achievement (Pekrun, Frenzel, Goetz, & Perry, 2007; Weiner, 1986). Indeed, once students experience shame, their ability to become cognitively engaged may be hindered, they may lose motivation for studying, and, they may feel reluctant to attend class (Turner, Husman, & Schallert, 2002).

Given the importance of gaining a better understanding of this self-conscious emotion, the current study explored the impact that "academic" shame had on learning of the human circulatory system with the hope that we can better understand students' experiences of this emotion.

Current Study

Materials

Test of self-conscious affect The TOSCA-3 (Tangney & Dearing, 2002) was developed as a tool to measure guilt-proneness, shame-proneness, proneness to externalization, and proneness to unconcern. The TOSCA-3 consists of 15 scenario-based situations that test takers may encounter in their day to day lives. Following each scenario, test takers are asked to rate the likelihood of reacting to each of the options on a five-point scale.

Pretest/posttest To assess deep conceptual understanding of the functioning of the human circulatory system, three separate tests were developed in the authors' research laboratory. One test consisted of ten multiple choice questions that were related to the human circulatory system. For example, *"the process of circulation includes which of the following: a) the intake of metabolic materials b) the convergence of metabolic materials throughout the organism c) the return of harmful by products to the environment* ***d) all of the above****".* A second test consisted of 20 matching questions in which the participants had to correctly identify the different components of the human heart. A third and final test consisted of 13 matching questions where the participants had to correctly label the proper functioning of the different parts of the human circulatory system. For example*, "which part of the human circulatory system carries blood away from the heart?" (answer: arteries).*

Self-regulated learning-self report survey (SRL-SRS) The SRL-SRS is intended to measure self-regulation as a relatively stable attribute in multiple learning domains and is based on Zimmerman's self-regulated learning theory. It is comprised of six subscales: planning, self-monitoring, evaluation, reflection, effort, and self-efficacy (Toering, Elferink-Gemser, Jonker, van Heuvelen, & Visscher, 2012).

Casual dimension scale-II The CDS-II consists of 12 closed ended 9-point Likert scale items designed to assess causal attributions related to achievement outcomes. The CDS-II measures attribution across the following four areas: locus of causality (e.g., the cause of your performance reflects an aspect of yourself), external control (e.g., the

cause of your performance is under the power of other people), stability (e.g., the cause of your performance is permanent), and personal control (e.g., the cause of your performance is something you can regulate) (McAuley, Duncan, & Russell, 1992).

Experiential shame scale According to Turner (2014), the Experiential Shame Scale (ESS) is "an opaque measure of physical, emotional, and social markers of shame experiences...developed to address the difficulties of assessing state shame." The ESS consists of eleven questions in which the test taker indicates the number that best describes how they feel right now when comparing two opposite word states. For example, "Physically, I feel [Very Warm 1--2--3--4--5--6--7 Very Cool]".

Participants

Participants consisted of 40 students from a private liberal arts university located in the southern United States. Volunteers fulfilled a course requirement in their general psychology class for their participation.

Procedure

Before entering the lab, participants were randomly assigned to either the experimental (i.e., shame induction) group or the control group. After completing the informed consent, participants were given as much time as needed to complete the TOSCA-3. They then completed the three circulatory system tests. Following completion of the pretests, participants then were asked to fill out the SRL-SRS.

Before beginning the ACT practice problems, participants were read the following instructions: "During this portion of the study you will be asked to complete a series of problems. **These are problems that, as a college student,** should not be extremely challenging for you. In order to recreate a scenario that would match an actual testing environment, you will have 30 minutes to complete the test. After you submit the test, instructions will appear on the screen that will let you know the next steps that you will need to take in this study. Please let the experimenter know if you have any questions at this time. Thank you again for your participation!" The bolded portion in the instructions is the only difference between what is read to participants in the control group and experimental group (i.e., experimental group receives the bolded statement). For the experimental (i.e., shame induction) group, after finishing the ACT, a text box appeared that stated "Your combined score on the test was: 40%. The average (school name; removed for blind reviews) student scored 90%. Please let the experimenter know your score so that it can be catalogued." The control group received the following feedback once they had completed the ACT practice problems: "You have now completed this portion of the study. Please let the experimenter know you are ready to proceed."

Immediately following the completion of the ACT practice problems, participants were asked to complete the Experiential Shame Scale in order to measure state shame (i.e., "in the moment shame"). Participants then filled out the Causal Dimension Scale-II and began interacting with a hypermedia encyclopedia (this served as our instructional delivery to assess the impact of shame on learning). Before interacting with the encyclopedia, they were read a set of instructions by the experimenter which told the learner that their job was to spend 30 minutes learning all they could about the human circulatory system. Participants were required to use the full 30 minutes before moving on from this part of the study. Following completion of the encyclopedia, participants were given the circulatory system posttests, were debriefed, and were then allowed to leave.

Results

Participants in the shame induction condition (M = 4.5) scored significantly higher on the ESS than participants in the control condition (M = 3.6), t (38) = 2.876, p = .007, d = .91. See Figure 1.

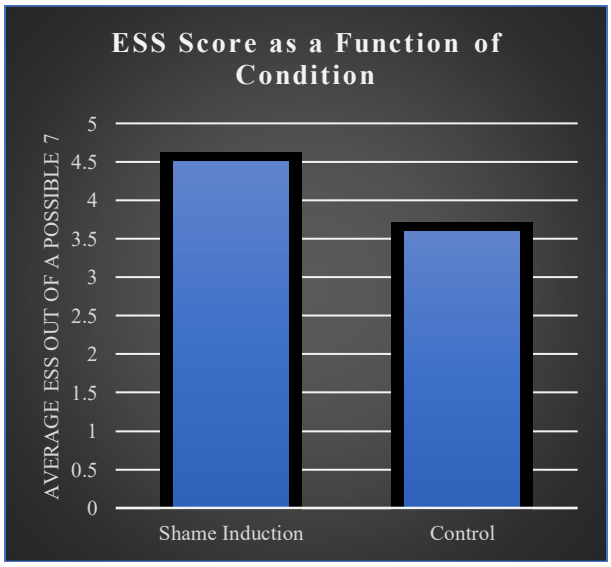

Figure 1: Average shame score as a function of condition.

Initial results revealed that participants in the control condition (M = 1.5) learned significantly more from pretest to posttest compared to participants in the shame induction condition (M = .50), F (1, 38) = 3.188, p = .04 (one-tailed) on the multiple-choice dependent measure. See Figure 2.

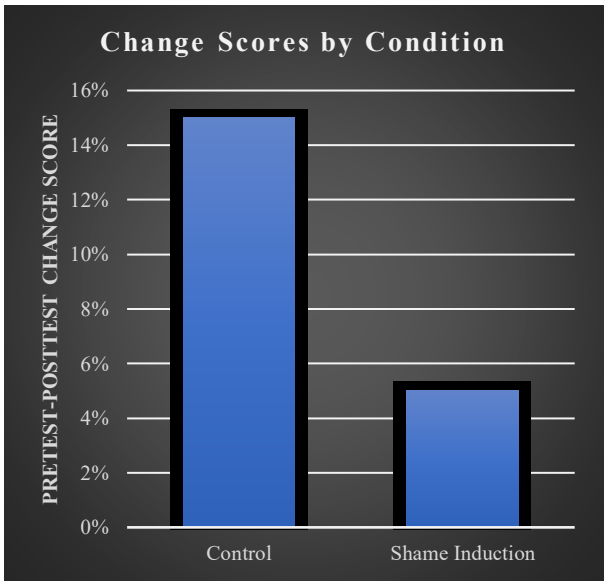

Figure 2: Average learning gain as a function of condition.

A significant main effect was found between the variables "shame proneness" with change scores as the dependent measures. More specifically, change scores on the matching test revealed that participants with a low proneness to shame (M = 5.4) learned significantly more than participants with a high proneness to shame (M = 2.1), p = .000. Additionally, when looking at all tests combined, participant with a low proneness to shame (M = 12.94) learned significantly more than participants with a high proneness to shame (M = 7.34), p =.002. See Figure 3.

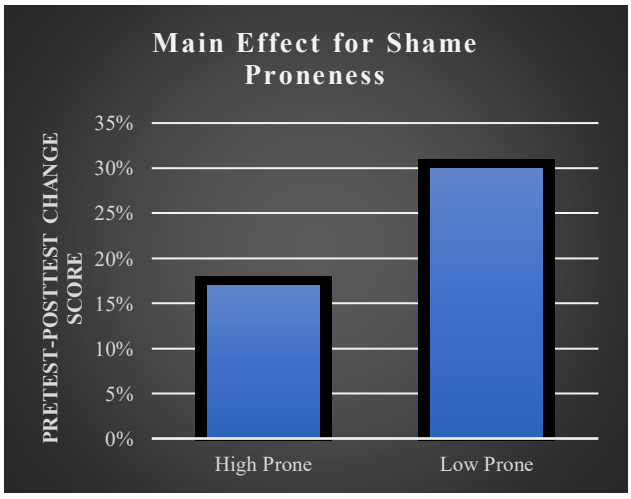

Figure 3: Average learning gain as a function of shame proneness.

Significant interactions were discovered between condition and shame proneness. Participants in the shame induction condition with a high proneness to shame (M = 2.18) learned significantly less than participants in the shame induction condition with a low proneness to shame (M = 6.5), p = .001 (Matching Test).

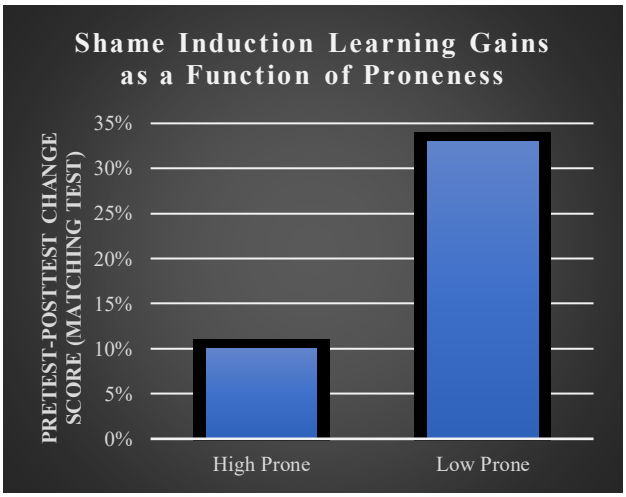

Figure 4: Average matching test learning gain for shame induction condition as a function of proneness.

Similarly, participants in the shame induction condition with a high proneness to shame (M = 3.82) learned significantly less than participants in the control condition with a low proneness to shame (M = 7.8), p = .05 (Labeling Test).

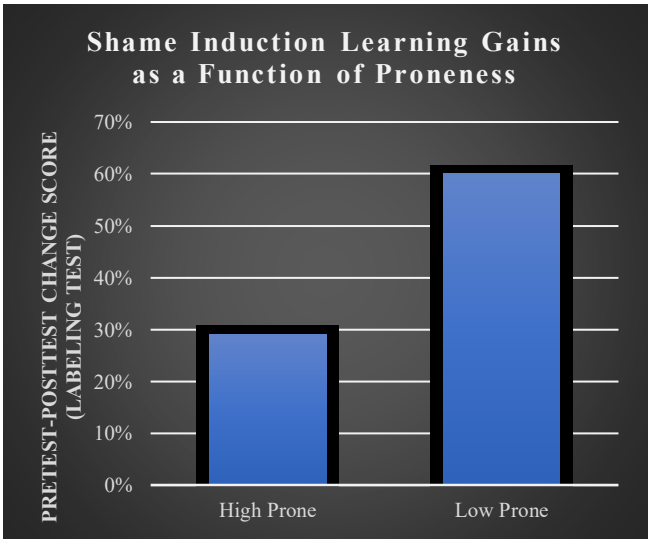

Figure 5: Average labeling test learning gain for shame induction condition as a function of proneness.

Additionally, participants in the control condition with a low proneness to shame (M = 4.3) learned significantly more than participants in the control condition with a high proneness to shame (M = 2.0), p = .036 (Matching Test Only).

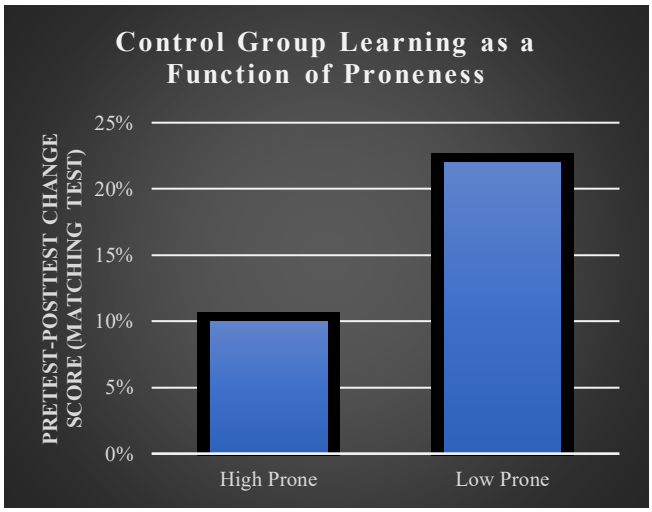

Figure 6: Average matching test learning gain for control condition as a function of proneness.

When looking at the change scores of all tests combined, participants in the shame induction condition with a high proneness to shame (M = 8.2) learned significantly less than participants in the shame induction with a low proneness to shame (M = 10.9), p = .002.

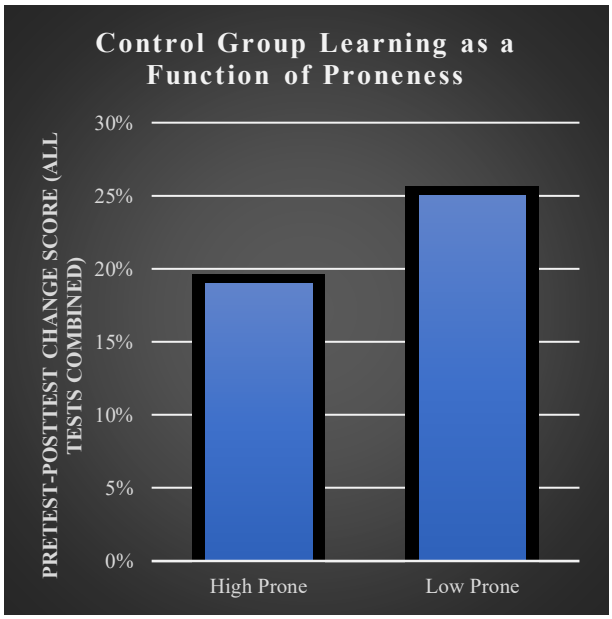

Figure 7: Average learning gains across all tests for control condition as a function of proneness.

Discussion

The results from the current study demonstrated that it is possible to have a systematic quantitative exploration of the self-conscious emotion shame. More specifically, those participants randomly assigned to the shame induction condition had higher instances of "in the moment" shame (as measured by the ESS) compared to those in the control condition. The methodology and findings are consistent with previous research that has found that feelings of shame are significantly positively correlated with feelings of shock (Turner, Husman, & Schallert, 2002).

Furthermore, as can be seen from these preliminary results, by and large, "in the moment" shame and shame proneness appear to be detrimental to the learning of complex science topics (i.e., human circulatory system). Participants randomly assigned to the shame induction condition learned significantly less about the circulatory system compared to participants in the control condition. Furthermore, a main effect was found showing that those with a high proneness to shame learned significantly less about the circulatory system compared to participants with a low proneness to shame. Finally, several significant interactions were discovered that revealed the detrimental impact of shame on learning. As mentioned earlier, this finding is in line with previous findings that have shown that feeling shame can interfere with motivation, and negatively impact students' academic goals and achievement (Pekrun, Frenzel, Goetz, & Perry, 2007; Weiner, 1986). Furthermore, once students experience shame, their ability to become cognitively engaged may be hindered, they may lose motivation for studying, and, they may feel reluctant to attend class (Turner, Husman, & Schallert, 2002).

What if a teacher was able to figure out which subset of students were actually experiencing shame and were able to be proactive to the potential negative consequences? Mitigating shame-consequences by understanding the who- and when-indicators of shame experiences, could facilitate teachers' ability to provide motivational interventions. A better understanding of the when and how of shame may be especially important given that individuals may deny their feelings, and may be unwilling or unable to express themselves, particularly if they self-isolate. In other words, as of now, we have no reliable way (other than perhaps self-report measures) to determine who is experiencing shame. Thus, intervention is near impossible without perceiving reliable indicators.

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