From the bottom of my heart: The impact of academic shame on learning of the circulatory system

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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, the amount learned was dependent on the interaction among the presence of academic shame, a participant's proneness to shame, and their performance attribution. Implications to education and future research are discussed.

Theoretical Framework

Self-conscious emotions are complex emotions characterized by a self-evaluation or self-reflection of ourself, behavior, or situation. The self-conscious emotion most pertinent to the current study is shame because of the impact that shame on learning related behavior (Turner, Husman, & Shallert, 2002). Shame is an acutely painful affective state 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).

Although research has suggested the *difficulties* in studying shame, these difficulties do not detract from the *importance* of studying shame. Tangney and Dearing (2002) suggest 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). However, some researchers postulate that shame may not be all bad, all the time (Probyn, 2005; Turner, Husman, & Schallert, 2002).

Given the importance of gaining a better understanding of this self-conscious emotion, the current study sought to answer the following questions: RQ1: Does an "in the moment" experience of academic shame affect learning? RQ2: Does having a proneness to shame affect learning? and RQ3: Do individuals differences (e.g., performance attribution) interact with shame and shame proneness in a way that affects learning?

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. Lastly, a third and final test consisted of 13 matching questions requiring 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 at that moment when comparing two opposite word states. For example, "Physically, I feel [Very Warm 1--2--3--4--5--6--7 Very Cool]".

Aptitude test

The aptitude test was developed using example ACT verbal and quantitative problems that were obtained from the official ACT website (ACT, n.d.).

Participants

Participants consisted of 61 students from a private liberal arts university located in the southern United States. Volunteers received extra credit 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." It warrants mentioning that

the participants did not know that the problems were practice ACT problems. They were simply told that the test was an aptitude assessment was that predictive of their overall intelligence.

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 completed the Causal Dimension Scale-II. Upon completion of the CDSII, participants began interacting with a hypermedia encyclopedia which 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 "You are being presented with a hypermedia encyclopedia, which contains textual information, static diagrams, and digitized video clips. We are trying to learn more about how students use hypermedia environments to learn about the circulatory system. Your task is to learn all you can about the circulatory system in 30 minutes. Make sure you learn about the different parts and their purpose, how they work both individually and together, and how they support the human body. I'll be here in case anything goes wrong with the computer or the equipment. Thank you again for your participation!" Participants were required to utilize the full 30 minutes before moving on from this part of the study. All audio and video were recorded during this portion of the experiment. Following completion of the encyclopedia, participants were given the circulatory system posttests (same as pretests), were debriefed, and were then allowed to leave.

Results

Following completion of data collection, trained judges reviewed the audio/video files to identify instances of behavioral disengagement during the learning intervention (i.e., hypermedia encyclopedia). Behavioral disengagement was operationalized as "a point at which a student opts to stop interacting with (quits) a given activity within a learning session" (Mills, Bosch, Graesser, & D'Mello, 2014). Any learner that spent more than 10% of the total time in a state of behavioral disengagement was thrown out of any subsequent analyses. Furthermore, no significant discoveries were found regarding the SRL-SRS and therefore it is not discussed in the following results.

An independent samples t-test was used to answer the question of whether it is possible to systematically manipulate and measure reliably the presence of academic shame,. Results revealed that participants in the shame induction condition (M = 4.34) experienced significantly higher amounts of state shame than did participants in the control condition (M = 3.79), $t(59) = 2.34$, $p = .02$, $d = .60$.

To assess whether the presence of academic shame had an impact on learning, an independent samples t-test was conducted using condition as our independent variable and learning measures as our dependent variable. Results revealed no significant differences between conditions on any of the four learning measures. See Table 1 for a full list of means.

Table 1: Means and standard deviations for different learning measures by condition

	Shame Induction Condition	Control Condition	Significance Level
Matching Change Score	2.61 (3.10)	3.11 (2.52)	.497
Labeling Change Score	4.94 (3.54)	4.93 (3.25)	.990
Multiple Choice Change Score	.61 (1.49)	1.21 (2.02)	.184
Overall Change Score	8.39 (5.39)	8.93 (5.21)	.697

To answer the question of whether shame proneness affects learning, an independent samples t-test was conducted using shame proneness as the independent variable and learning measures as the dependent variable. Results revealed that participants with a high proneness to shame (M = 11.5%) had significantly lower change scores (post-pre) on the matching test compared to participants with a low proneness to shame (M = 22.3%), $t(58) = -2.569$, $p = .013$, $d = .80$. Furthermore, it was discovered that participants with a high proneness to shame (M = 7.72) had significantly lower overall change scores (post-pre on all combined learning measures) compared to participants with a low proneness to shame (M = 26.65%), $t(58) = -2.358$, $p = .02$, $d = .74$.

To explore any possible interactions between condition and shame proneness a 2 (Condition) X 2 (Proneness) Between Subjects ANOVA was used. Participants in the shame induction condition with a high proneness to shame (M = 10.15%) had significantly lower change scores (post-pre) on the matching test compared to students in the shame induction condition with a low proneness to shame (M = 24%), $p = .041$. Additionally, participants in the shame induction condition with a high proneness to shame (M = 17.2%) had significantly lower overall change scores (post-pre on all combined learning measures) compared to participants in the shame induction condition with a low proneness to shame (M = 28.84%), $p = .05$. See Figure 1.

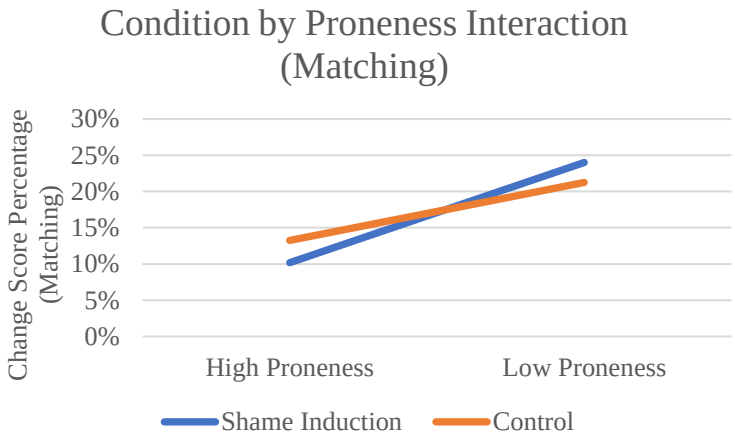

Figure 1. Condition by proneness interaction on matching test.

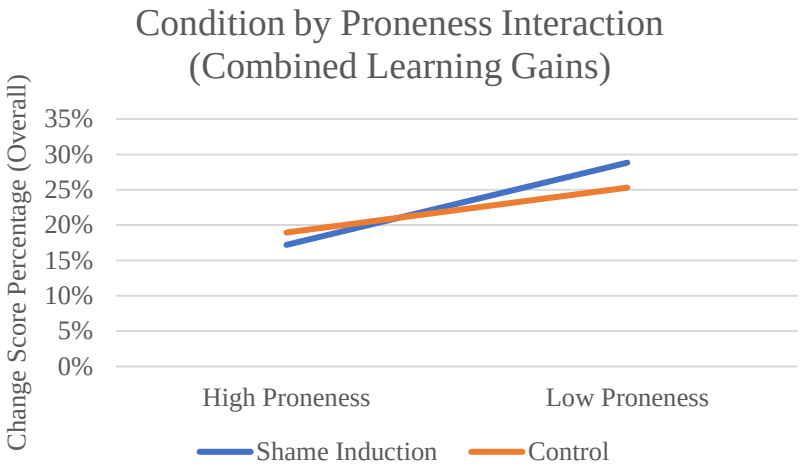

Figure 2. Condition by proneness interaction on all tests combined.

To explore interactions among condition, shame proneness, and performance attribution a 2 (Condition) X 2 (Proneness) X 2 (Locus of Causality) ANOVA was utilized. Several significant interactions were discovered among the variables. Participants who identified as having a high locus of causality (as measured by the Causal Dimension Scale) coupled with a low proneness to shame (as measured by the TOSCA) had significantly higher change scores on the matching test (M = 22%) compared to participants with a high locus of causality and a high proneness to shame (M = 11.25%), p = .03.

Furthermore, participants with a high locus of causality and a high proneness to shame (M = 17.95%) had significantly lower overall change scores when compared to participants with a high locus of causality and a low proneness to shame (M = 26.81%), p = .03.

Lastly, a three-way interaction was discovered between condition, shame proneness, and locus of causality. More specifically, participants in the shame induction condition, with a high locus of causality, and that are high in shame proneness (M = 9.45%) had significantly lower change scores on the matching test compared to participants that were in the shame induction condition, with a high locus of causality, and low in shame proneness (M = 24%), p = .04. See Table 2 for full list of means on matching test change scores (post-pre percentages).

Table 2: Condition by shame proneness by locus of causality change score percentages

Condition	High/Low Shame Proneness	High/Low Locus of Causality	Matching Change Scores Percentages
Shame Induction	High TOSCA	High Locus of Causality	9.45
Shame Induction	High TOSCA	Low Locus of Causality	11.9
Shame Induction	Low TOSCA	High Locus of Causality	24
Shame Induction	Low TOSCA	Low Locus of Causality	N/A
Control	High TOSCA	High Locus of Causality	13.1
Control	High TOSCA	Low Locus of Causality	13.6
Control	Low TOSCA	High Locus of Causality	20
Control	Low TOSCA	Low Locus of Causality	25

A 2 (Condition) X 2 (Proneness) X 2 (External Control) ANOVA was conducted to explore possible interactions. A significant main effect was discovered for External Control, F (1, 52) = 4.00, p = .05, η^2=.072. More specifically, participants that scored high in external control had significantly lower combined change scores (M = 18.74%) compared to participants that scored low in external control (M = 26.7%), p = .05.

Moreover, a significant pairwise comparison was discovered between External Control and Shame Proneness. Participants with a low external control and a high proneness to shame (M = 12.5%) learned significantly less on the matching test than participants with a low external control and a low proneness to shame (M = 29.2%), p = .017.

A significant Condition by Shame Proneness by External Control interaction was revealed on the combined learning measure, F (1, 52) = 3.14, p = .04 (one-tailed), η^2=.057. Pairwise comparisons revealed that participants in the shame induction condition with low external control and a high proneness to shame (M = 11.35%) scored significantly lower on the matching learning measure when compared to students in the shame induction condition with low external control and a low proneness to shame (M = 33.35%), p =.013.

Similar interaction results were discovered on the combined learning measures, Participants in the shame induction condition with low external control and a high proneness to shame (M = 17.84%) had significantly lower combined change scores compared to participants in the shame induction condition with low external control and a low proneness to shame (M = 37.21%), p = .012.

Participants in the shame induction condition with a low proneness to shame and high external control scored significantly lower on the combined learning measures (M = 16.28%) compared to participants in the shame induction condition with a low proneness to shame and low external control (M = 37.21%), p = .05. See Table 3 for full list of means on combined learning measures (post-pre percentages).

Table 3: Condition by shame proneness by locus of external control change score percentages

Condition	High/Low Shame Proneness	High/Low External Control	Combined Change Scores Percentages
Shame Induction	High TOSCA	High External Control	16.46
Shame Induction	High TOSCA	Low External Control	17.83
Shame Induction	Low TOSCA	High External Control	16.27
Shame Induction	Low TOSCA	Low External Control	37.2
Control	High TOSCA	High External Control	17.16
Control	High TOSCA	Low External Control	26.16
Control	Low TOSCA	High External Control	25.11
Control	Low TOSCA	Low External Control	25.58

A 2 (Condition) X 2 (Proneness) X 2 (Stability) ANOVA was conducted to explore possible interactions. A significant main effect was discovered for stability, F (1, 52) = 4.28, p = .04, η^2=.07. On the *multiple choice* learning measure, participants scoring *high in stability* (M = 19.9%) had significantly higher change scores than did the participants with a *low stability score* (M = 6.4%), p = .04.

Furthermore, a significant condition by stability interaction was found, F (1,52) = 7.20, p = .01, η^2=.12. Participants with high stability in the shame induction condition had significantly lower change scores on the

matching test (*M*= -0.63%) compared to participants with high stability in the control condition (*M* = 20%), *p* = .019.

Participants in the shame induction condition with high stability (*M* = -0.63) scored significantly lower on the matching compared to participants in the shame induction condition with low stability (*M* = 21.47%), *p* = .009. Participants in the shame induction condition with high stability (*M* = 11.05%) scored significantly lower on the combined learning measures compared to participants in the shame induction condition with low stability (*M* = 26.04%), *p* = .04.

Participants with low stability and a high proneness to shame (*M* = 11.35%) had significantly lower change scores on the matching than participants with low stability and low proneness to shame (*M* = 25.75%), *p* = .005. Participants with low stability and a high proneness to shame (*M* = 18.86%) had significantly lower change scores on the combined learning measures than participants with low stability and low proneness to shame (*M* = 29.07%), *p* = .025. Participants with a low proneness to shame with high stability (*M* = 15%) had significantly lower change scores on the multiple choice test compared to participants with a low proneness to shame and low stability (*M* = 51.5%), *p* = .04.

Finally, a significant condition by proneness by stability interaction was discovered on both the matching, $F(1,52) = 5.015$, $p = .029$, $\eta^2 = .09$ and combined learning measures $F(1,52) = 5.261$, $p = .026$, $\eta^2 = .09$. More specifically, those with a low proneness to shame and high stability in the shame induction condition (*M* = -10%) had significantly lower change scores on the matching test compared to those with a low proneness to shame and high stability in the control condition (*M* = 25%), *p* = .024.

Participants in the shame induction condition with low stability and a high proneness to shame (*M* = 10.4%) had significantly lower change scores on the matching test than those in the shame induction condition with low stability and a low proneness to shame (*M* = 32.5%), *p* = .003.

Similarly, participants in the shame induction condition with low stability and a high proneness to shame (*M* = 17.19%) had significantly lower change scores on the combined measures than participants in the shame induction condition with low stability and a low proneness to shame (*M* = 34.88%), *p* = .007.

Participants in the shame induction condition with a low proneness to shame and high stability (*M* = -10%) had significantly lower change scores on the matching test than participants in the shame induction condition with a low proneness to shame and low stability (*M* = 32.5%), *p* = .005.

Participants in the control condition with a high proneness to shame and high stability (*M* = 25.7%) had significantly higher change scores on the multiple choice tests than participants in the control condition with a high proneness to shame and low stability (*M* = 5.38%), *p* = .015.

Participants in the shame induction condition with a low proneness to shame and high stability (*M* = 4.65%) had significantly lower combined change scores compared to participants in the shame induction condition with a low proneness to shame and low stability (*M* = 34.88%), *p* = .024. See Table 4 for full list of means on matching test change scores (post-pre percentages).

Table 4: Condition by shame proneness by stability change score percentages

Condition	**High/Low Shame Proneness**	**High/Low Stability**	**Matching Change Scores Percentages**
Shame Induction	High TOSCA	High Stability	8.75
Shame Induction	High TOSCA	Low Stability	10.43
Shame Induction	Low TOSCA	High Stability	-10
Shame Induction	Low TOSCA	Low Stability	32.5
Control	High TOSCA	High Stability	15
Control	High TOSCA	Low Stability	12.3
Control	Low TOSCA	High Stability	25
Control	Low TOSCA	Low Stability	19

A 2 (Condition) X 2 (Proneness) X 2 (Personal Control) ANOVA was conducted to explore possible interactions. A significant pairwise comparison was discovered between condition and personal control. Participants with low personal control in the shame induction condition (*M* = 5.9%) had significantly lower change scores on the matching test than participants with low personal control in the control condition (*M* = 20.5%), *p* = .03.

Furthermore, participants in the shame induction condition with high personal control (*M* = 18.55%) had significantly higher change scores on the matching test compared to participants in the shame induction condition with low personal control (*M* = 5.9%), *p* = .023.

Similarly, participants with high personal control and a high proneness to shame (M = 17.6%) had significantly lower combined test change scores compared to those high in personal control with a low proneness to shame (M = 26.81%), p = .04.

Finally, participants in the shame induction condition with high personal control and a high proneness to shame (M = 16.14%) had significantly lower change scores on the combined measures compared to those in the shame induction condition with high personal control and a low proneness to shame (M = 28.84%), p = .04. See Table 5 for full list of means on matching test change scores (post-pre percentages).

Table 5: Condition by shame proneness by personal control change score percentages

Condition	**High/Low Shame Proneness**	**High/Low Personal Control**	**Matching Change Scores Percentages**
Shame Induction	High TOSCA	High Personal Control	13.1
Shame Induction	High TOSCA	Low Personal Control	5.9
Shame Induction	Low TOSCA	High Personal Control	24
Shame Induction	Low TOSCA	Low Personal Control	N/A
Control	High TOSCA	High Personal Control	10.5
Control	High TOSCA	Low Personal Control	16
Control	Low TOSCA	High Personal Control	20
Control	Low TOSCA	Low Personal Control	25

Discussion

Results suggest that "in the moment" shame by itself does not affect learning. In other words, no significant differences in learning were discovered on any of the learning measures for those randomly assigned to the shame induction condition versus the control (i.e., no shame induction) condition.

However, shame proneness (i.e., having a greater likelihood of experiencing shame in any given situation) did significantly affect learning. More specifically, participants that entered the learning intervention with a high proneness to shame learned significantly less on various learning measures compared to those with a low proneness to shame. Additionally, for participants with a high proneness to shame, the detrimental effects were exacerbated depending on the condition. When participants with a high proneness to shame were placed in the shame induction condition, learning was negatively impacted compared to those in the shame induction condition with a low proneness to shame. These results seem to suggest that the impact of shame is dampened in those who are not accustomed to experiencing shame (i.e., less shame prone).

The causal dimension scale (i.e., performance attribution scores) yielded exciting and unexpected results. For example, when students experience a perceived failure and interpret the failure as saying something about who they are (internal; *high locus of causality*), the negative impact on learning is worse in those students who also have a high proneness to shame.

In addition, it was discovered that participants who felt they had no way of regulating their performance (i.e., *high external control*) learned significantly less than those who did feel capable of regulating their performance. However, after experiencing a perceived failure, having a feeling that can you regulate your learning was only beneficial in those who also had a low proneness to shame. In other words, having a high proneness to shame washes away the benefits of having a sense of self-regulation.

Regarding the performance attribution construct of stability (e.g., something is stable over time), it was discovered that after a perceived failure, participants that view their performance as being stable learned significantly less than those who view their performance as being temporary. However, as with other attribution constructs, the benefit of viewing perceived failure as being temporary is washed away in those that have a high proneness to shame.

The final construct of interest related to performance attribution is personal control. After a perceived failure, participants who feel they do not have personal control over their performance are subsequently learning significantly less than those who feel they do have control over their recent perceived failure. Consistent with previous interactions, it was found that after a perceived failure, even when participants felt they had control over their performance, if they also had a high proneness to shame, the benefits of personal control were negated.

Taken all together, and adding to the body of research on self-conscious emotions, it can be seen that the impact of perceived failure and a subsequent feeling of shame is largely driven by the learners' perception of

who/what was the cause of their performance. However, the attributions of learners' with high shame proneness are largely irrelevant in the face of a shame experience.

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