Enhancing Student Effort for Improved Institutional Accountability Data: The Impact of Motivation Priming Interventions

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ABSTRACT

Using data from a public US university, we examined the effectiveness of a priming intervention to increase student effort when completing low-stakes tests for institutional accountability. Prior to completing tests of general education outcomes, students were asked to reflect upon their motivation to perform well. The self-identity priming questions resulted in higher self-reported effort than the control condition, the university creed questions resulted in higher testing time than the control condition, and neither priming condition increased test performance. However, Pell Grant eligibility moderated the priming effect on effort. Priming resulted in self-reported effort for Pell eligible students being the same or higher than noneligible students. Also, ethnicity moderated the priming effect on test scores. White students scored higher than underrepresented students in the control condition, but this difference disappeared with priming. Insights from our study include ways to enhance the quality of data collected for institutional accountability and optimize resource allocation (cost-savings).

PREVIOUS STUDIES

- We employed a new strategy to increase effort: the question-behavior effect (QBE). Asking people questions about their future behavior (volunteering) increases their likelihood of performing the behavior (Wilding et al., 2016).
- In the initial study examining the QBE in a low-stakes assessment context (Finney & McFadden, 2023), incoming first-year college students completing low-stakes accountability tests were randomly assigned to 1 of 3 question conditions: no questions; answering intended effort questions ("I will engage in good effort throughout the test"); and answering intended effort questions with reference to a positive self-identity ("As a conscientious test-taker, I will engage in good effort throughout the test"). Students then completed unproctored cognitive assessments. Students primed with either set of questions exhibited higher self-reported effort, lower proportions of rapid responding to items, and lower percentage of data filtered due to low effort.
- Finney et al. (2024) examined QBE with 2nd-year college students and explored if gender moderated QBE. Students were randomly assigned to the same three conditions. Each student completed a cognitive assessment and self-reported effort. Additionally, response time was collected. There was no effect of QBE condition for male students for either effort measure. Female students had significantly and practically higher self-reported effort and response time for question conditions vs. no questions.

PURPOSE OF CURRENT STUDY

Building upon previous studies of the question-behavior effect (QBE), we examined the following five research questions
- Does the QBE emerge for effort and test scores with graduating senior college students?
- Do differences in the self-identities primed in the questions impact the size of the QBE on effort?
- Is the effect of priming on effort differential across student demographic groups?
- Is the effect of priming on test scores differential across student demographic groups?
- Could an increase in effort through priming decrease the amount of invalid data removed, providing a cost benefit to an institution?
- Are results consistent when effort is operationalized using response time and self-reported effort?

METHODS

Participants

3,311 graduating senior college students were required to complete a low-stakes test on Intercultural Competency and Diversity (ICD)
- 2,204 students provided consent for the study
- Majority of students self-identified as female (54.6%), White (85.9%), non-Pell eligible (88.9%), non-transfer (84.4%), and not first generation (88.0%)
- Missing data on some student characteristics, which resulted in differing sample sizes when examining moderation of QBE

Randomly Assigned to 1 of 3 Question Conditions:
1. No Questions (control group)
2. Positive Self-Identity Questions:
   - "As a conscientious test-taker, I will engage in good effort throughout the test."
   - "I, a motivated student, will give my best effort on this test."
   - "As a hardworking student, I will persist to completion of the test."
3. University Creed Questions:
   - "As someone who believes in education, which gives me knowledge to work wisely, I will engage in good effort throughout the test."
   - "As someone who believes that this is a practical world and that I can count only on what I earn, I will give my best effort on this test."
   - "As someone who believes in hard work, I will persist to the completion of the test."

Measures

Test Performance on Analyze & Act portion of ICD
- 40 multiple choice items; scores range from 150 to 180
- Students given 1 hour to complete

Self-Reported Expended Effort
- 5-Item Effort Subscale from Student Opinion Survey
- Completed at end of testing session

Response Time
- Each student's time spent on the assessment was converted to minutes for the purposes of evaluating the effectiveness of the priming questions

Condition	Questions Prior to Testing	Test	DVs
1	No Questions (control)	ICD	• Test Performance • Expended Effort • Response Time
2	Positive Self Identity	ICD	• Test Performance • Expended Effort • Response Time
3	University Creed	ICD	• Test Performance • Expended Effort • Response Time

RESULTS

Effect of Priming Condition across the Three Outcomes

To examine the effect of priming condition on the three outcomes of interest (self-reported effort, response time, test performance), we conducted separate one-way ANOVAs for each outcome. As expected, there were significant effects of priming on self-reported effort [$F(2, 2201) = 5.0$, $p = .007$] and response time [$F(2, 2201) = 3.6$, $p = .027$]. For self-reported effort, the Positive Self-identity priming questions resulted in higher effort than the No Question condition. For response time, the University Creed priming questions resulted in students spending more time on the test than the No Question condition. However, the effect on test performance was not significant [$F(2, 2201) = 2.5$, $p = .085$].

Group Differences by QBE Condition and Student Characteristics

We assessed the significance of the interaction between several student characteristics (gender, ethnicity, transfer status, first-generation status, Pell eligibility) and priming condition with respect to self-reported effort, response time, and performance. Gender, transfer status, and first-generation status did *not* interact with priming condition for any of the three outcome variables. Thus, general statements about the impact of priming on these outcomes can be made across these groups.

However, when examining self-reported effort, Pell eligibility interacted with priming condition, such that the question-behavior effect was stronger for students who were Pell eligible [interaction effect: $F(2, 2129) = 5.9$, $p = .003$]. When we did not prime students, Pell eligible students put forth significantly less effort (4.15) than those who were not Pell eligible (4.33). However, when we primed students with University Creed questions, the Pell eligible students put forth an equal (not significantly different) amount of effort (4.38) as students who were not Pell eligible (4.35). Notably, when we primed students with positive self-identity questions, the Pell eligible students put forth significantly more effort (4.54) than students who were not Pell eligible (4.39). Thus, it appears that we have the opportunity to enhance expended effort from Pell eligible students via priming questions.

Ethnicity moderated the effect of priming on test performance, [interaction effect: $F(2, 2046) = 3.23$, $p = .040$], with a positive effect for underrepresented students. Specifically, in the No Question condition (typical testing condition), underrepresented students scored significantly lower (170.49) than White students (172.91). However, when primed with either set of questions, there was no difference in test scores across the two student groups. It appears that priming students can increase test scores for underrepresented students, erasing performance differences across the ethnic groups.

Cost-Benefit Analysis of Priming

- Each test costs the university $8 per student. Thus, any amount of unusable data due to low effort is not cost-effective.
- When filtering based on self-report effort, we found the following number of students would have been removed due to low effort: Control Group = 35 students out of 656; Positive Self-Identity Group = 33 out of 852 students; University Creed Group = 23 out of 696.
- To put this into a cost perspective, the Control Group removed $280 worth of test scores, the Positive Self-Identity Group removed $264 worth of test scores, and the University Creed removed $184 worth of test scores.
- Based on the low removal rates, we determined that for the purposes of our study, any cost benefits based around priming for low effort would only be warranted for an institution or office that had financial hardships or had much more disengagement on assessments. For institutions or offices that do not have financial constraints or have limited disengagement (as we did), priming for low effort is likely not going to be effective to impact costs.

Table 1. *Interaction between priming condition and the three outcomes of interest*

| Condition | Self-reported Effort | | | | Response Time | | | Performance | |
	N	Mean	SD	d	% filtered	Mean	SD	d	Mean	SD
No Questions	656	4.30a	.62	-	5.34%	38.35a	7.44	-	172.24a	6.22
Positive Self-Identity	852	4.40a	.60	.16	3.87%	38.68ab	7.83	.04	171.95a	6.24
University Creed	696	4.35ab	.58	.08	3.30%	39.45b	8.05	.14	171.49a	6.56

Note. Effort scores can range from 1 to 5, with higher scores reflecting higher levels of self-reported effort. Response time was reported in minutes. Within a column, means with different subscripts are statistically significantly different. d = Cohen's d effect size when comparing the No Questions condition to each question condition. Self-reported effort "% filtered" is the percentage of students in that condition whose scores were flagged for removal due to low self-reported effort (at or below a summed score of 15 across 5 effort items as suggested by Swerdewski et al. (2011)). Mean test performance in each condition is based on all students without filtering low-effort students.

Table 2. *Interaction of Pell eligibility and priming condition on self-reported effort*

| Condition | Pell Eligible | | | | Not Pell Eligible | | | |
	N	Mean	SD	d	N	Mean	SD	d
No Questions	70	4.15a	.65	-	566	4.33a	.65	-
Positive Self-Identity	106	4.54b	.50	.69	713	4.39a	.60	.10
University Creed	60	4.38b	.66	.35	620	4.35a	.58	.03

Note. Effort scores can range from 1 to 5, with higher scores reflecting higher self-reported effort. Within a column, means with different subscripts are statistically significantly different. d = Cohen's d effect size when comparing the No Questions condition to each question condition.

Table 3. *Interaction of ethnicity and priming condition on test performance*

| Condition | White | | | | Underrepresented | | | | |
	N	Mean	SD	dW	N	Mean	SD	dU	dE
No Questions	551	172.91	5.74	-	65	170.49	7.10	-	.41
Positive Self-Identity	701	172.46	5.74	.08	92	172.33	5.41	.29	.02
University Creed	583	172.05	6.20	.14	60	172.05	5.10	.25	.00

Note. d_E = Cohen's d effect size comparing performance for the two ethnic groups within each priming condition (i.e., White students are .41 SD higher on test performance than underrepresented students in the No Questions condition which is statistically significant, but the two ethnic groups are not significantly different on test performance in the two priming conditions, d = .02 and .00). d_W = Cohen's d effect size comparing the No Questions condition to each question condition for White students. d_U = Cohen's d effect size comparing the No Questions condition to each question condition for underrepresented students.

IMPLICATIONS & FUTURE RESEARCH

Implications

Priming for "good effort" Remains Promising
- Even when questions are reduced from 5 to 3 for a graduating student population
- Thus, we recommend assessment practitioners use 1 to 2 minutes to ask students to answer three priming questions prior to engaging in low-stakes assessments

Self-Identity vs University Creed Questions
- It is premature to advise one set of questions over other given differential effects.
- Both priming conditions positively impacted test scores for underrepresented senior students, which is encouraging but needs to be replicated.
- If pressed to select one type of question, if institution operationalizes effort via:
  - self-report measures → we recommend using self-identity priming questions as they had largest effect
  - response time → we recommend using creed-infused/school-spirit related priming questions

Considerations for Future Research

Student Characteristics
- QBE was moderated by certain student characteristics, and we hope future studies can capture more complete information (we had missing data on some student demos) and intersectionality
- We recognize the extreme crudeness of our classification of White & underrepresented students
  - Our sample was representative of the University's demographics
  - We were limited in the comparison that could be made
  - Future research should be conducted with more diverse populations. This study is beginning this research investigating student characteristics that moderate the QBE in testing contexts.

First-Year Students & Creed-Infused Questions
- Given our results comparing self-identity and creed questions with graduating seniors, we encourage studies that explore if first-year students are impacted by creed-infused questions
- It may be that a university's creed resonates more/less with incoming students depending on the university's culture. These are research questions worth pursuing