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## **The Impact of Transparent Instructions Upon Academic Confidence and Writing Performance**

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### **Abstract**

Recent demographic changes in college enrollment have increased the emphasis on student retention. Practices such as transparent assignments are one possible way to increase retention, but more empirical data regarding student outcomes are needed. In this quasi-experimental study, students received either transparent or standard instructions for written assignments and completed a survey of academic confidence. A pre-test/post-test design examined potential differences associated with instruction type. Results indicated no significant differences in essay scores or survey responses between conditions, and there were no consistent trends indicating improved performance in the transparent condition.

Two recent demographic trends have significant implications for the future of higher education. First, college enrollment in the United States has decreased nearly 10% since 2010 (Hanson, 2022), with most of the attrition occurring at public institutions (National Student Clearinghouse Research Center, 2022). Although these enrollment declines started before 2020, they were likely exacerbated by the COVID-19 pandemic (Conley & Massa, 2022; Hanson, 2022; National Student Clearinghouse Research Center, 2022). Second, the birth rate in the United States declined by 20% from 2007 to 2022 (Kearney et al., 2022). Thus, an “enrollment cliff” is predicted when this cohort of children reaches college age; enrollments are predicted to drop as much as

15% starting in 2025, with regional four-year universities likely taking the hardest hit (Barshay, 2018; Carey, 2022; Grawe, 2018).

In response to these trends, higher education institutions are increasing their emphasis on student retention, often promoting the use of high-impact teaching strategies to achieve this goal (e.g., Bonet & Walters, 2016; Thomas et al., 2018; University of Maine System, 2022). One such practice is the use of transparent assignment instructions, which provide not only basic directions for completing the assignment but also supplemental information such as the grading criteria, the assignment’s purpose, the skills the assignment is intended to develop, and/or examples of successful and

unsuccessful work (Winkelmes, 2013b). The goal is to provide students clear and comprehensive guidelines for successfully completing assignments, thus decreasing ambiguity and frustration while increasing confidence and performance (Anderson et al., 2013; Burton & Cuffe, 2005; Bearman & Ajjawi, 2018; Collier & Morgan, 2008; Dorman & Knightley, 2006; Fisher et al., 2016; Jivet et al., 2020; Musselman et al., 2016; Ortega & Minchala, 2017; Winkelmes, 2013; Winkelmes et al., 2016). Evidence suggests that the use of transparency is associated with positive outcomes such as increased academic confidence (Anderson et al., 2013; Fisher et al., 2016; Musselman et al., 2016; Ou, 2018; Pierce, 2017; Walton & Cohen, 2011; Winkelmes et al., 2016), greater student investment and interest in coursework (Alkharusi, 2013; Alkharusi et al., 2013, 2014; Anderson et al., 2013; Race, 2001; Salis et al., 2016; University of Illinois, 2011), greater sense of belonging and purpose (Anderson et al., 2013; Balloo et al., 2018; Lavhelani et al., 2020; Ou, 2018; Winkelmes et al., 2016), and improved performance (Alkharusi, 2016; Burton, 2006; Finley & McNair, 2013; Ou, 2018; Winkelmes et al., 2016). These outcomes are all relevant for both immediate and long-term academic success and thus for the issue of retention.

Also relevant is that transparency interventions are reported to be particularly effective for first-generation, low-income, and non-White students (e.g., Balloo et al., 2018; Collier & Morgan, 2008; Ferarri et al., 2015; Finley & McNair, 2013; Howard et al., 2019; Walton & Cohen, 2011; Winkelmes, 2013; Winkelmes et al., 2016). These students have traditionally been found to experience more struggles in navigating the higher education environment, generally attributed to factors such as lack of contextual knowledge (Collier & Morgan, 2008),

stereotype threat (Pierce, 2017), and societal biases that produce a lack of opportunity and perpetuate inequities (Harris et al., 2020; hooks, 1994.). These students may also be more likely to attend regional four-year universities. Thus, it behooves the higher education system in general—and regional four-year universities in particular—to create more welcoming environments to attract and, perhaps more importantly, retain these students (Harris et al., 2020; Pierce, 2017; Winkelmes et al., 2016). Transparency may be one element of such environments.

However, more research is needed to fully understand transparency's effectiveness. Some previous research, while promising, lacks empirical evidence of improved performance (Acosta-Morales et al., 2016; Lavhelani et al., 2020; Salis et al., 2016; Winkelmes, 2013) or focuses solely on perceptions of or feelings about transparency (Acosta-Morales et al., 2016; Anderson et al., 2013; Bacchus et al., 2019; Chan & Ho, 2019; Cheng et al., 2015; Jonsson, 2014; Lavhelani et al., 2020; Porshnev et al., 2021). To overcome these limitations, the current study used a quasi-experimental design in which students in different sections of an undergraduate psychology course received either transparent or standard instructions for written assignments. The students' scores on two essays, scored by blind raters, were compared to examine whether students who received transparent instructions earned higher scores than students who did not. As in other studies of transparency (e.g., Ou, 2018; Winkelmes et al., 2016), the students also completed a survey about aspects of the educational experience, such as feeling capable of learning independently, believed to be enhanced by transparency (Winkelmes, 2014). Based on previous research (Alkharusi, 2016; Burton, 2006; Finley & McNair, 2013; Ou, 2018; Winkelmes et al.,

2016), it was hypothesized that students receiving transparent instructions would earn higher assignment and overall course grades and report more confidence in their academic abilities. A secondary hypothesis, again based on prior research, was that the benefits of transparency would be greater for non-White, low-income, and first-generation college students (e.g., Balloo et al., 2018; Collier & Morgan, 2008; Ferarri et al., 2015; Finley & McNair, 2013; Walton & Cohen, 2011; Winkelmes, 2013; Winkelmes et al., 2016).

## Methods

### Participants

The participant pool came from 142 students who were enrolled in a lower-division lifespan developmental psychology course taught at Georgia Southwestern State University (GSW), a small public university in the southern United States. Four sections of the course were examined, two each taught in the Fall semester of two consecutive years (2017 and 2018). Each semester, one section met at 8:00 a.m. on Monday/Wednesday mornings, and the other met at 3:30 p.m. on Tuesday/Thursday afternoons.

Institutional demographic data from Fall 2020 indicated that 41% of GSW's students identified as non-White and 47% were first-generation college students (Georgia Southwestern State University, 2021). Additionally, in Fall 2021, 63% of degree-seeking undergraduates received at least one offer of need-based financial aid. Thus, this institution has enough non-White, first-generation, and low-income students to render it appropriate for addressing hypotheses about transparency interventions with these groups.

### Intervention

Within semesters, one section of the course received transparent instructions for assignments, and the other received standard instructions. These conditions were counterbalanced across semesters to control for possible effects of class meeting time. In 2017, the morning section received standard instructions and the afternoon section received transparent instructions; in 2018, the reverse was true. Both instructions can be found at the Center for Open Science Open Science Framework website (Cotter, 2022; <https://osf.io/w6keb/>). No other elements of the course were modified for transparency; the instructor, textbook, in-class lectures, exams, and syllabus were all kept constant across sections and semesters.

### Measures

An adaptation of the Transparency in Learning and Teaching (TILT) Higher Education Survey (Winkelmes, 2014) was administered in paper-and-pencil format during class, once at the beginning of the semester and again at the end. This modified version (Cotter, 2022; <https://osf.io/9wqxn/>) was shortened to include only the demographic questions, the 10 “core questions” used for pre-test and post-test purposes in the TILT project (questions 13-20 and 30-31 of the TILT survey), and a question regarding social belonging (question 48 of the TILT survey). Questions 13-20 and 48 used the answer options *Never*, *Sometimes*, *Often*, and *Always*; for questions 30-31, the answer options were *Low*, *Moderate*, and *High*. It should be noted that the question numbering in the previous sentence refers to the numbering on the original TILT survey (Winkelmes, 2014), not the numbering used in the current study.

To maintain anonymity and minimize social desirability influences, the surveys did not request any potentially identifying information such as student names or ID numbers. However, to track changes from the beginning to the end of the semester, students were asked to provide three pieces of information (i.e., high school mascot, mother's name, and zodiac sign) for the purpose of matching their early- and late-term responses. A total of 81 students completed both the pretest and posttest surveys; therefore, the demographic data in Table 1 represent only the data from those 81 participants and not the 142 students in the overall sample.

The effectiveness of transparency was measured through student performance on writing assignments. As part of the course requirements, students completed nine short (one-page) essays. All instructions for these assignments were posted in the online learning management system at the start of the semester and explained in class roughly one week before each assignment's due date. Students were notified that the instructor was conducting research about the effects of instruction wording on writing performance, but were not told the characteristics of the different conditions or which condition they were in.

For our purposes, only the first and last assignments were examined: the first to determine whether the intervention had an immediate effect, and the last to see if the intervention had had an effect by the end of the semester after the students in the transparent condition had had repeated exposure to the transparent instructions. Data were collected for 123 Essay 1 submissions (65 transparent, 58 standard) and 115 Essay 9 submissions (63 transparent, 52 standard). Two independent raters blinded to student

identity, condition, section, and year scored the submissions on a scale from 1-5, with higher scores indicating better quality. The raters used a structured rubric (Cotter, 2022; <https://osf.io/yf3cq/>) assessing five criteria in a binary fashion: detail, evidence of critical thinking, quality of writing, perceived effort, and relevance to the assigned topic. Cronbach's alpha determined that interrater reliability was .69 for Essay 1 and .73 for Essay 9, indicating acceptable interrater reliability.

Although the written assignments were the only element of the course that explicitly varied by transparency, previous research has shown improvements in broader aspects of academic performance, such as final exam grades, associated with the use of transparency (e.g., Alkharusi, 2016; Howard et al., 2019; Ou, 2018). Information regarding final exam scores and letter grade distributions was obtained from the online course management system.

### **Data Analysis**

To examine the effects of the transparency intervention on essay scores, the readers' scores were averaged for each essay, and this average score was used in the final data analysis. Data from the same intervention conditions were combined; the 2017 and 2018 standard sections formed a standard condition, and 2017 and 2018 transparent sections formed a transparent condition. The essay ratings for each condition were compared using a factorial analysis of variance (ANOVA) with a between-subjects factor of transparency and a within-subjects factor of time. For this

Table 1

*Demographic Characteristics of Sample<sup>a</sup>*

| Variable                                    | 2017<br>Morning<br>Standard<br>( <i>n</i> = 18) |      | 2017<br>Afternoon<br>Transparent<br>( <i>n</i> = 14) |      | 2018<br>Morning<br>Transparent<br>( <i>n</i> = 27) |      | 2018<br>Afternoon<br>Standard<br>( <i>n</i> = 22) |      | Overall<br>( <i>n</i> = 81) |      |
|---|---|------|--|------|--|------|---|------|-----------------------------|------|
|   | <i>n</i>  | %    | <i>n</i>   | %    | <i>n</i>   | %    | <i>n</i>  | %    | <i>n</i>                    | %    |
| <b>Gender</b>                               |   |      |  |      |  |      |   |      |                             |      |
| Female                                      | 18  | 100  | 13   | 92.9 | 19   | 70.4 | 15  | 68.2 | 65                          | 80.2 |
| Male  | 0   | 0    | 1  | 7.1  | 8  | 29.6 | 7   | 31.5 | 16                          | 19.8 |
| <b>Race/ethnicity</b>                       |   |      |  |      |  |      |   |      |                             |      |
| White                                       | 12  | 66.7 | 10   | 71.4 | 17   | 63.0 | 13  | 59.1 | 52                          | 64.2 |
| Black                                       | 4   | 22.2 | 2  | 14.3 | 9  | 33.3 | 7   | 31.5 | 22                          | 27.2 |
| Hispanic/Latino <sup>b</sup>                | 1   | 5.6  | 1  | 7.1  | 1  | 3.7  | 0   | 0.0  | 3                           | 3.7  |
| Asian <sup>c</sup>                          | 0   | 0.0  | 0  | 0.0  | 0  | 0.0  | 1   | 4.5  | 1                           | 1.2  |
| Multiracial                                 | 1   | 5.6  | 1  | 7.1  | 0  | 0.0  | 1   | 4.5  | 3                           | 3.7  |
| <b>First-generation<br/>college student</b> |   |      |  |      |  |      |   |      |                             |      |
| Yes   | 7   | 38.9 | 10   | 71.4 | 1  | 3.7  | 3   | 13.6 | 21                          | 27.2 |
| No  | 11  | 61.1 | 4  | 28.6 | 26   | 96.3 | 19  | 86.4 | 60                          | 72.8 |
| <b>Household income<sup>d</sup></b>         |   |      |  |      |  |      |   |      |                             |      |
| Below median                                | 14  | 82.4 | 5  | 50.0 | 10   | 45.5 | 12  | 66.7 | 41                          | 61.2 |
| Above median                                | 3   | 17.6 | 5  | 50.0 | 12   | 54.5 | 6   | 33.3 | 26                          | 38.8 |

*Note.* <sup>a</sup> The data in this table represent only the students who completed both administrations of the TILT survey. <sup>b</sup> The original survey question asked about specific heritage (e.g., Mexican, Puerto Rican, Cuban, etc.). These categories have been collapsed into one variable here. <sup>c</sup> The original survey question asked about specific heritage (e.g., Chinese, Filipino, Samoan, etc.). These categories have been collapsed into one variable here. <sup>d</sup> The numbers and percentages for this variable may not match the group membership in the column headers because some students chose not to answer this question.

analysis, only students who completed both Essay 1 and Essay 9 were examined, with their respective scores matched for each participant. We were able to match individual students' Essay 1 and Essay 9 submissions for 55 students in the transparent condition and 49 students in the standard condition. The final exam scores for all students in each condition (i.e., not just the ones who completed both Essay 1 and Essay 9) were compared with independent samples *t*-tests (nondirectional and  $\alpha = .05$ ). The overall frequencies of course letter grades in the standard and transparent groups (again, using all students) were compared through chi-square tests, with a Yates correction due to some cells having fewer than five cases.

For the secondary hypothesis, we created subgroups based on the students' answers to the TILT survey demographics questions asking about race/ethnicity, first-generation status, and income. In these subgroups, "low-income" was defined as having an income below the median. We then split our data file by the categorical variable of interest (i.e., race/ethnicity, first-generation status, and income) and compared group differences using independent samples *t*-tests. Separate *t*-tests were conducted to examine scores in the standard and transparent conditions for each group. This comparison of subgroups provides a more fine-grained analysis of the effects of transparency by examining, for example, whether non-White students improved more under the transparency intervention than white students (Balloo et al., 2018; Collier & Morgan, 2008; Ferarri et al., 2015; Finley & McNair, 2013; Walton & Cohen, 2011; Winkelmes, 2013; Winkelmes et al., 2016).

For our data analysis, the survey answer options *Never*, *Sometimes*, *Often*, and *Always* were coded as 1, 2, 3, and 4 respectively. The survey answer options *Low*, *Moderate*, and *High* were coded as 1, 2, and 3 respectively. For each survey question, change scores were calculated by subtracting the pretest score from the posttest score, and independent samples *t*-tests were conducted on these change scores to examine differences between standard and transparent conditions. All tests were non-directional (two-tailed), with a traditional criterion for statistical significance at  $\alpha = .05$ . The effect size was calculated as Hedges' *g*, which is more appropriate for groups of slightly unequal sizes than Cohen's *d* and has also been used in similar studies of transparency (e.g., Winkelmes et al., 2016).

## Results

Our factorial ANOVA indicated no main effect for transparency ( $F(1, 102) = 0.468, p = .495, \eta^2_p = .005$ ). Students in the transparent condition did not earn significantly higher scores than students in the standard condition on either Essay 1 ( $M = 3.73, SD = 0.78$  and  $M = 3.71, SD = 0.78$  respectively) or Essay 9 ( $M = 3.38, SD = 0.70$  and  $M = 3.24, SD = 0.75$  respectively). There was no transparency by time interaction ( $F(1, 102) = 0.588, p = .445, \eta^2_p = .006$ ), indicating no group differences over time. However, there was a main effect of time, with both groups showing declining scores,  $F(1, 102) = 26.155, p < .001, \eta^2_p = .204$ .

The mean scores on the final exams for students in the transparent ( $n = 76, M = 75.16, SD = 19.83$ ) and standard ( $n = 66, M$

Table 2

*Change scores on survey questions from beginning to end of semester, by condition*

| Survey question   | <u>Standard</u> |           | <u>Transparent</u> |           | <i>t</i> (79) | <i>p</i> | Hedges' <i>g</i> |
|---|-----------------|-----------|--------------------|-----------|---------------|----------|------------------|
|   | <i>M</i>        | <i>SD</i> | <i>M</i>           | <i>SD</i> |               |          |                  |
| I can express my ideas effectively when I write.  | .15             | .70       | .00                | .77       | -.91          | .364     | .20              |
| I can communicate effectively when I speak.   | -.08            | .66       | .02                | .76       | .63           | .530     | .14              |
| I collaborate well with others on academic work. <sup>a</sup>   | .03             | .71       | -.03               | .80       | -.30          | .767     | .01              |
| I am good at breaking down theories, ideas and experiences into pieces so I can consider them. <sup>b</sup> | .13             | .73       | .07                | .61       | -.37          | .715     | .09              |
| When I am given information from multiple sources, I have an easy time making connections between them.     | .20             | .72       | .12                | .60       | -.53          | .598     | .12              |
| I am able to apply the things I have learned to new problems and situations.                                | .03             | .73       | .07                | .65       | .31           | .755     | .06              |
| I tend to consider the ethical implications of my actions.  | -.05            | .90       | .17                | .83       | 1.14          | .257     | .25              |
| I am capable of learning on my own.   | -.10            | .78       | .17                | .70       | 1.64          | .104     | .36              |
| I feel that I am a member of my school's community.   | .18             | .81       | .05                | .77       | .72           | .476     | .16              |
| Please rate your confidence about your ability to succeed in school.  | .03             | .42       | .05                | .55       | .22           | .827     | .04              |



Table 2 (continued)

| Survey question  | Standard |      | Transparent |      | $t(79)$ | $p$  | Hedges' $g$ |
|--|----------|------|-------------|------|---------|------|-------------|
|  | $M$      | $SD$ | $M$         | $SD$ |         |      |             |
| Please rate your confidence about your ability to succeed in this field. | .10      | .50  | -.07        | .61  | -1.40   | .165 | .30         |

*Note.* Sample sizes are  $n = 40$  for the standard condition and  $n = 41$  for the transparent condition unless otherwise noted in cases where participants chose not to answer a certain question. Negative means indicate lower scores at the end of the semester than at the beginning. Negative  $t$  scores indicate values trending in the opposite direction of the hypothesis. <sup>a</sup> For the standard and transparent conditions,  $n = 39$  and  $n = 40$  respectively. <sup>b</sup> For the standard condition,  $n = 39$ .

= 75.30,  $SD = 19.42$ ) conditions did not significantly differ,  $t(140) = .04$ ,  $p = .965$ . Additionally, a chi-squared test examining the distribution of final course grades for the standard and transparent conditions was not statistically significant,  $X^2(4, n = 140) = 2.23$ ,  $p = .694$ .

Results of the analysis of change scores on the survey questions are in Table 2. A positive  $t$  value indicates that the students in the transparent condition improved more than the students in the standard condition over the semester, while a negative  $t$  value indicates the opposite. None of these survey questions had statistically significant change scores, indicating that students in the transparency condition did not show more improvement than those in the standard condition. The effect sizes ranged from .01 (no effect) to .36 (small effect). For five of the 11 questions, the students in the standard condition improved more than the students in the transparent condition, a trend opposite of the anticipated transparency effect.

Results of the analysis of survey data differences based upon ethnicity/race,

income level, and first-generation status are shown in Table 3. For the sake of parsimony, only the effect sizes are shown for each variable; however, data analysis outputs showing means, standard deviations, and  $t$ -test results for each survey question and subgroup can be found in the “Results of Subgroup Analyses” folder on this project’s Center for Open Science Open Science Framework web page (Cotter, 2022; <https://osf.io/asy4f/>). In Table 3, the effect size in each column indicates the degree of difference between the standard and transparent conditions for the group specified in the column header; e.g., the first value in the first row represents the degree of difference between the standard and transparent conditions for non-White students, the second value in the first row represents the degree of difference between the standard and transparent conditions for white students, and so on. In general, effect sizes of .5 or higher indicate a moderate effect. While some of the values in the table indicate moderate to large effects, it should be noted that there was no consistent pattern. For some questions, students in the transparent condition improved less than

Table 3

*Effect sizes (Hedges g) for degree of change on survey questions from beginning to end of semester, by race/ethnicity, income, and first-generation status*

| Survey question   | Race/Ethnicity             |                        | Income               |                       | First-generation     |                     |
|---|----------------------------|------------------------|----------------------|-----------------------|----------------------|---------------------|
|   | Non-White<br><i>n</i> = 29 | White<br><i>n</i> = 52 | Low<br><i>n</i> = 41 | High<br><i>n</i> = 26 | Yes<br><i>n</i> = 21 | No<br><i>n</i> = 60 |
| I can express my ideas effectively when I write.  | .19*                       | .22*                   | .40*                 | .14*                  | .26*                 | .18*                |
| I can communicate effectively when I speak.   | .22                        | .12                    | .01                  | .26                   | .11*                 | .24                 |
| I collaborate well with others on academic work.  | .09*                       | .05* <sup>a</sup>      | .11                  | .32 <sup>d</sup>      | .53*                 | .15 <sup>f</sup>    |
| I am good at breaking down theories, ideas and experiences into pieces so I can consider them.          | .38*                       | .10 <sup>b</sup>       | .10* <sup>c</sup>    | .15                   | .30* <sup>e</sup>    | .00                 |
| When I am given information from multiple sources, I have an easy time making connections between them. | .17*                       | .08*                   | .04*                 | .09                   | .19*                 | .10*                |
| I am able to apply the things I have learned to new problems and situations.                            | .30*                       | .31                    | .23                  | .07                   | .13                  | .06                 |
| I tend to consider the ethical implications of my actions.  | .29                        | .22                    | .26                  | .28                   | .42                  | .21                 |
| I am capable of learning on my own.   | .14                        | .45                    | .19                  | .36                   | .13                  | .42                 |
| I feel that I am a member of my school's community.   | .15*                       | .64                    | .32*                 | .09                   | .47*                 | .04                 |
| Please rate your confidence about your ability to succeed in school.                                    | .24                        | .00                    | .36                  | .13                   | .17*                 | .16                 |

Table 3 (continued)

| Survey question  | Race/Ethnicity             |                        | Income               |                       | First-generation     |                     |
|--|----------------------------|------------------------|----------------------|-----------------------|----------------------|---------------------|
|  | Non-White<br><i>n</i> = 29 | White<br><i>n</i> = 52 | Low<br><i>n</i> = 41 | High<br><i>n</i> = 26 | Yes<br><i>n</i> = 21 | No<br><i>n</i> = 60 |
| Please rate your confidence about your ability to succeed in this field. | .48*                       | .24*                   | .16                  | .40*                  | .88*                 | .11*                |

*Note.* Asterisks indicate survey items for which participants in the transparent condition had negative change scores, indicating a decline from the beginning to end of the semester, and/or had change scores lower than participants in the standard condition, indicating less progress. Superscripts indicate a sample size lower than in the column header in cases where participants chose not to answer a certain question. <sup>a</sup> *n* = 50. <sup>b</sup> *n* = 51. <sup>c</sup> *n* = 40. <sup>d</sup> *n* = 24. <sup>e</sup> *n* = 20. <sup>f</sup> *n* = 5

students in the standard condition; for other questions, students in the standard condition improved, while students in the transparent condition declined. Overall, however, students who identified as non-White, low-income, or first-generation were less likely to demonstrate improved performance following the transparency intervention. Of the *t*-tests conducted, only one approached statistical significance: First-generation students in the standard condition had slightly higher change scores than students in the transparent condition in their responses to the question asking them to rate their confidence about their ability to succeed in this field,  $t(19) = 2.01, p = .059$ .

### Discussion

In this study, students receiving transparent assignment instructions did not perform significantly better than students receiving standard instructions, either on the assignments assessed or on other indicators such as course grades, academic confidence,

or feelings of social belonging. Scores on writing assignments actually declined over the course of the semester regardless of condition, and the degree of decline was similar across conditions. It is possible that the decline in ratings from Essay 1 to Essay 9 is due to a course policy that allowed students to drop their lowest essay grade; thus, the Essay 9 submissions may overly represent lower-performing students who missed one or more earlier assignments and were forced to complete Essay 9 because they had already used their drop grade. However, these results are consistent with the general trend of no significant between-condition differences in essay scores.

Additionally, while students in both conditions improved on some aspects of academic confidence (e.g., breaking down theories) and social belonging (e.g., feeling like a member of their school's community), students in the transparency condition did not consistently outperform students in the standard condition and in some cases

actually showed less improvement or greater decline, although again these differences were not statistically significant. Thus, our results do not replicate previous findings of academic and socioemotional improvements following transparency interventions (Alkharusi, 2013; Alkharusi et al., 2013, 2014; Anderson et al., 2013; Burton, 2006; Finley & McNair, 2013; Fisher et al., 2016; Musselman et al., 2016; Ou, 2018; Pierce, 2017; Race, 2001; Salis et al., 2016; University of Illinois, 2011; Walton & Cohen, 2011; Winkelmess et al., 2016).

The current results are, however, consistent with some that reported negative findings. Ferrari and colleagues (2015) used a quasi-experimental design to compare students assigned to transparency and control conditions and found no significant differences in students' perception of transparency or performance on problem-based assignments. In that study, both the experimental and control groups consistently demonstrated improved performance at post-test, and the authors proposed that the instructional methods received by the control group were sufficiently effective without the added transparency materials (Ferrari et al., 2015). Another study using a quasi-experimental design found that transparency was associated with better performance on homework assignments, but only if applied throughout the semester; furthermore, online students receiving a full semester's worth of transparent design performed similarly to students who received traditional face-to-face instruction with no transparency (Howard et al., 2019). Young and colleagues (2019) found that their transparency intervention was not associated with higher scores on exams, although students who received the intervention had positive attitudes toward the exam, including reduced anxiety, perceptions of increased fairness of

the exam, and greater feelings of mutual respect between students and instructor.

While negative results are always challenging to interpret, an obvious potential explanation is that transparency does not work. As mentioned previously, much of the existing transparency research has not used an experimental or even quasi-experimental design; i.e., there was no comparison group. The improvements demonstrated in previous studies may have occurred due to other factors besides transparency, such as increased experience with higher education. Our findings support this notion.

However, there are other possible explanations that highlight directions for future research in this area. Students were told that other sections may have different assignment instructions, but were not told to avoid discussing these differences. Within semesters, students in different conditions may have discussed their experiences in a way that diluted the effects of the intervention. The challenge of preventing such spillover has been noted elsewhere (Acosta-Morales et al., 2018) and is a difficult element to control in educational research. However, it seems unlikely that any cross-contamination occurred on such a large scale that it completely obliterated any transparency intervention effects in the present study.

Another question is how well students in the transparent condition actually used the transparency elements of the instructions. While not directly solicited, anecdotal evidence suggests that regardless of condition, students primarily attended to the portion of the instructions addressing the task requirements, information which was common across conditions. While the standard instructions contained less detail

than the transparent instructions, they were intended to provide enough information to enable the students to earn a passing grade on the assignment. It is possible that this was sufficient to create a ceiling effect, thus not allowing much room for improvement by adding enhanced instructions (Ferrari et al., 2015). Further research needs to investigate more systematically the amount and type of information necessary for students to successfully meet assignment goals. Simply providing information does not guarantee that it will be useful (Balloo et al., 2018); students may find it overwhelming (Bacchus et al., 2019; Ferrari et al., 2015) or view it as condescending (Anderson et al., 2013) or conveying lack of trust (Kizilcec, 2016).

The question of detail may also intersect with student motivation. Not all students have the same learning goals or criteria for success. Some students merely want to earn a passing grade, some want to earn the highest grade possible, and others seek to master the content regardless of grade (Alkharusi, 2011; Balloo et al., 2018; Bearman & Ajjawi, 2018; deBraga et al., 2015; Jivet et al., 2020). The degree of transparency in instructions may matter less to students with performance or grade-oriented goals, particularly those who simply aim to pass the class (Jivet et al., 2015). These students may focus on the basic task instructions and disregard any extra information as being a waste of their time. However, merely meeting the criteria for an assignment does not guarantee learning (Anderson et al., 2013; Bearman & Ajjawi, 2018). Examining the intersection of transparency and student motivation may give insight into how students are likely to respond following transparent instruction.

Experience with higher education may also be relevant. Novices, such as

freshmen, may particularly benefit from transparency because they have less experience to draw on and therefore need more guidance (Ambrose et al., 2010; Balloo et al., 2018; Bearman & Ajjawi, 2018; Lang, 2016). In the current study, freshmen constituted about 65% of the overall sample, with 61% of the transparency condition composed of freshmen. If freshmen were indeed more likely to benefit from transparency, we would expect to see that represented here, and we did not. However, as previously noted, some researchers have proposed that first-generation and ethnic minority college students may also be considered novices in that they may lack familiarity with the culture of higher education (Balloo et al., 2018; Collier & Morgan, 2008; Ferrari et al., 2015; Finley & McNair, 2013; Harris et al., 2020; hooks, 1994; Pierce, 2017; Walton & Cohen, 2011; Winkelmes, 2013; Winkelmes et al., 2016). Thus, class membership may interact with other demographic variables (e.g., ethnicity), and separating them may be challenging, particularly with small sample sizes.

On a related note, the issue of sample size in the current study should not be ignored. Our overall sample was smaller than in previous studies: about 110 compared to around 600 (e.g., Winkelmes et al., 2016). This raises the possibility that insufficient statistical power may partly explain the non-significant outcomes. A post-hoc analysis of statistical power was done based on effect sizes reported by Winkelmes et al. (2016). This analysis shows that for the questions with large effect sizes (example, “amount of transparency”,  $ES = .7$ ; see their Figure 2) a sample size of 34 in each group would be sufficient to reach 80% power. Accordingly, the present study, with 40 or 41 in these groups, should have enough statistical power to find statistically

significant results for the questions with the largest effects. However, other analyses suggest that our sample sizes may have been too small for finding significance in questions yielding smaller effect sizes. For the comparisons of subgroups, our numbers of first-generation, low-income, and non-White students may not have been large enough to detect any intervention-related differences. In this study, approximately 36% of the sample identified as non-White and 27% as first-generation; while not trivial numbers, it is possible that the transparency intervention would have yielded statistically significant results with more students in those categories.

In general, although this study failed to find significant enhancements in performance or perceptions of academic ability following the use of a transparency intervention, this does not indicate that transparency is not worth pursuing. Not all intervention strategies will work for all students, groups of students, or even institutions, so it may be necessary to take a multi-pronged approach in the selection and implementation of educational interventions. Although not assessed in the current study, evidence suggests that students often appreciate transparency (Acosta-Morales et al., 2016; Anderson et al., 2013; Chan & Ho, 2019; Cheng et al., 2015; Kumar et al., 2019; Lavhelani et al., 2020; Young et al., 2019). Even if it is not associated with dramatic improvements in performance, incorporating transparency may lead to retention by creating positive attitudes in students, such as the perception that professors are caring and oriented toward student success. There are many reasons why students may leave or stay in college, so a single approach may not sufficiently address that issue. If transparency is helpful for improving the student attitudes mentioned above, it may be

one of many tools instructors can use to facilitate student success and forestall dropping out.

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