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USING WEB SURVEYS TO REACH COMMUNITY COLLEGE STUDENTS: AN ANALYSIS OF RESPONSE RATES AND RESPONSE BIAS

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This study was designed to examine response rates and bias among a sample of community college students who received a district-wide survey by standard mail or e-mail. Findings suggest that predictors of response and types of responses are not appreciably different across paper and online mail-out samples when these samples are "matched" in terms of key demographics. Rates of response, however, differ by mode of survey administration, gender, and race/ethnicity.

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As online surveys are increasingly used by institutional researchers, several questions about this popular medium of data collection invariably surface, especially when online instruments are compared to traditional paper instruments. First is the issue of response rates. Do online surveys yield higher rates of response than do paper surveys? By which method can institutional researchers collect the most data? Second is the issue of nonresponse bias, or differences between survey respondents and nonrespondents (demographically, attitudinally, or otherwise). Is the nonresponse bias characteristic of online surveys similar to or different from that of paper surveys? Do online surveys steer data collection toward new (and possibly less skewed) respondent pools, or do they reproduce the respondent bias found in paper surveys? Still a third issue is response bias. That is, are there differences between online survey responses and paper survey responses, despite identical survey items? Close analysis of response bias is particularly critical when surveys are distributed as paper and electronic forms within a single administration, and it clarifies further the methodological implications of data collection via the Internet.

With these issues in mind, the present study is designed to examine response rates, nonresponse bias, and response bias across two groups of community college students: those who received a district-wide follow-up survey of their college experiences via email, and those who received this survey by standard mail. The results of this study not only paint a clearer picture of differences and similarities between online surveys and paper surveys, but also inform efforts to equate online survey data with paper survey data in a single, mixed-mode administration. Further, by focusing this study on community college students, we stand to learn more about a group of students who are notoriously difficult to locate and who historically have had lower-than-average survey participation rates.

Though the literature on response rates, nonresponse bias, and response bias among online and paper surveys is not extensive, several studies in this burgeoning area of research merit discussion. These studies are reviewed below, following brief comments on the advantages and disadvantages of online data collection.

ONLINE SURVEYS

Notwithstanding the increasing popularity of, and reliance on, the Internet, the use of online surveys for institutional research carries with it many challenges (Hamilton, 1999; Goree & Marszalek, 1995). One concern is that of access. Goree and Marszalek (1995) and Umbach (2004) warn that access to computers is not equal—those

with the most power in society enjoy the broadest access to new and different forms of technology, while those with the least power find themselves on the margins of the Information Age. Ebo (1998) agrees that disadvantaged or underrepresented populations have insufficient access to the resources of cyberspace, a finding also noted for college freshmen (Sax, Ceja, & Teranishi, 2001). Thus, the sample of individuals who respond to an online survey may not be entirely representative of the study's intended population, though Umbach (2004) suggests that this problem may dissipate as Web literacy becomes more ubiquitous. This reality must be addressed before generalizing online survey data to a larger group.

Other methodological challenges include concerns about data security, which could lead to nonresponse (Smith, 1997), and human subjects guidelines that may be unclear about online research (Hamilton, 1999). However, the appeal of online surveys is indisputable: completing a questionnaire on the Internet is more cost-efficient for many institutions and more convenient for many "computer savvy" subjects like college students (Carini, Hayek, Kuh, Kennedy, & Ouimet, 2003).

RESPONSE RATES, NONRESPONSE BIAS, AND RESPONSE BIAS

Relatively few studies examine response rates, nonresponse bias, and response bias by electronic and paper modes of survey administration, although the findings of those that do cast doubt on methodological strengths of online data collection relative to more traditional formats. In a comparison of paper surveys to online surveys, Matz (1999) observed little difference in types of responses and respondent demographics by survey format. However, the paper survey yielded a higher rate of response than did the online survey. So too observed Underwood, Kim, and Matier (2000): Among the college students in their study, rates of response were higher among those who received a paper survey than among those who received a survey by e-mail. The authors also noted that response rates of women were higher than those of men regardless of survey format, as was true of the White, Asian American, and international students in their sample.

Sax, Gilmartin, and Bryant (2003) randomly assigned a sample of nearly 5,000 college students at 14 four-year institutions to one of three survey administration groups: (a) paper survey only, (b) paper survey with the option to complete the questionnaire online, and (c) online survey only. The authors found that the rate of response was highest among students who received the paper survey with online option, and was lowest among students who received the online

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version of the instrument only. Like the students in Underwood, Kim, and Matier's (2000) study, women responded in greater numbers than did men; response rates also were highest among Asian American students, as compared to other racial/ethnic groups. In terms of nonresponse bias, being female increased the odds of response across all administration groups. Other predictors varied by group, but these were few in number, and did not yield enough evidence to conclude that nonrespondents to online surveys were substantially different than were those to paper surveys. Relatedly, Carini et al. (2003) observed that survey format (online versus paper) did not appreciably impact responses among a national sample of college students, although subjects tended to respond more favorably to some questions when completing the questionnaire online.

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OBJECTIVES

Building on the work of Sax et al. (2003), Carini et al. (2003) and others, the present study is designed to compare community college students who received a follow-up survey of their college experiences via e-mail to community college students who received this survey via standard mail. The study addresses three questions:

1. **Do response rates differ by mode of survey administration?**
2. **Do the predictors of response differ by mode of survey administration? (nonresponse bias)**
3. **Are item-by-item responses to online surveys different than item-by-item responses to paper surveys? (response bias).**

The goal of this study is to determine if different modes of survey administration yield substantively similar survey data. Similar data imply that online surveys are methodologically equivalent to paper surveys, but they do little to reduce traditional biases in the respondent pool and types of survey responses. Disparate data imply that online surveys are not equivalent to paper surveys, but they might increase the representation of certain groups who otherwise might not respond to the survey itself.

METHODOLOGY

Sample

Data for this study draw from the 2001 Transfer and Retention of Urban Community College Students (TRUCCS) baseline survey

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and the 2002 TRUCCS follow-up survey. Funded by the U.S. Department of Education, TRUCCS is designed to examine the myriad factors that influence persistence, transfer, and achievement among students enrolled in the Los Angeles Community College District (LACCD). In keeping with this goal, the TRUCCS surveys include a range of questions about students' family life, employment history, classroom experiences, educational goals, and personal values. TRUCCS represents a collaboration between the University of Southern California (USC), the University of California Los Angeles (UCLA), and LACCD.

In spring 2001, the TRUCCS baseline survey was administered to a stratified sample of 5,001 students at nine LACCD campuses. Members of the TRUCCS project team at USC and UCLA distributed paper surveys in 241 classrooms; students were instructed to complete the survey as part of a larger study of community college student experiences and educational pursuits. To maximize variation in the sample, a proportionate mix of remedial, standard, vocational, and gateway courses were selected as sites for survey administration. Subsequent analyses confirmed that students who were enrolled in these courses resembled the larger LACCD population in terms of race, ethnicity, age, and primary language.

So to examine these students' experiences longitudinally, subjects who completed the TRUCCS baseline survey were mailed or e-mailed the TRUCCS follow-up survey in winter and spring 2002, or approximately one year after the baseline survey was distributed. Follow-up surveys were administered by mail or e-mail depending on the type of contact information that students provided on the baseline survey. In other words, surveys were sent via e-mail to students who listed a valid e-mail address, and via standard mail to students who did not list a valid e-mail address, or did not list an e-mail address at all. Second and third waves of the survey were distributed to first-wave nonrespondents, sometimes via e-mail *and* standard mail if students provided both types of contact information. However, the sample for the present study is limited to those students who received the 2002 TRUCCS follow-up survey as a paper or electronic questionnaire (and for those who returned the follow-up survey via the mode in which they were initially contacted) in order to calculate more accurate rates of response and "cleaner" estimates of bias. Students who were excluded from this study either (a) received the follow-up survey as a paper and electronic instrument, (b) did not provide any valid address at which to contact them for the follow-up study, or (c) were contacted by telephone in the final months of data collection to maximize overall response (of the 5,001 baseline respondents, a total of 614 fell into one of these three categories).

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Our sampling design also accounts for self-selection bias in the online and paper mail-out samples. Recall that students placed themselves in one or the other mail-out sample by virtue of whether they listed a valid e-mail address on the baseline survey. Given that students who provide a valid e-mail address may be quite different from those who do not, it was important to "equate" our online and paper mail-out samples to the extent possible. Preliminary analyses indicated key predictors of self-selection into either mail-out sample, including marital status, number of children, race/ethnicity, plans to transfer to a four-year college, and computer ownership. These criteria were used to "match" the online mail-out sample (original $N = 1{,}555$) to the paper mail-out sample (original $N = 2{,}832$), resulting in a final sample for this study of 1,040 individuals who received the follow-up survey as a paper form, and 1,040 individuals who received the follow-up survey as an online form (total $N = 2{,}080$). As a "matched" sample, these two groups are equally distributed across marital status, number of children, race/ethnicity, plans to transfer, and computer ownership variables.

Research Methods

As part of this study, three sets of analyses were conducted:

- **Descriptive analyses to calculate response rates by mode of follow-up survey administration, sex, and race/ethnicity. These included frequencies and cross-tabulations.**
- **Logistic regression analyses to explore nonresponse bias by mode of follow-up survey administration. These analyses compared the predictors of response to the follow-up survey across two groups: students who received the survey as a paper form (Group A), and students who received the survey as an electronic form (Group B). A total of four logistic regression analyses were performed. The first two analyses regressed each dependent variable (Paper Response to the Follow-Up Survey, for students in Group A, and E-mail Response to the Follow-Up Survey, for students in Group B) on 28 independent variables using stepwise procedures. Next, statistically significant predictors of each dependent variable ($p < .01$) were pooled and force-entered into a second set of logistic regressions in order to compare the same predictors across each group. Missing values on independent variables were replaced with the mean of each variable by administration group (missing values for any given variable did not exceed 15% of the sample).**

- **Independent sample *t* tests to determine response bias by mode of follow-up survey administration. Here, mean responses to 113 items on the follow-up survey were compared across two groups: students who submitted the paper form (Group A) and students who submitted the electronic form (Group B). Those items with statistically significant mean differences ($p < .01$) between Groups A and B were flagged for discussion.**

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Variables for the Logistic Regression Analyses

As noted above, the dependent variables for these analyses were Paper Response to the Follow-Up Survey (1 = no, 2 = yes) for students in Group A, and E-mail Response to the Follow-Up Survey (1 = no, 2 = yes) for students in Group B. Based on findings from previous studies of online and paper surveys (Matz, 1999; Sax et al., 2003; Underwood et al., 2000), a total of 28 independent variables were selected for the stepwise logistic regression analyses, all of which drew from the TRUCCS baseline dataset. These included race/ethnicity, sex, age, average income, plans to attend the same college next semester, number of other colleges/universities attended, and plans to transfer to a four-year college or university. Hours per week spent on campus, doing housework or childcare, and working at a job also were included in these analyses, as were students' average grades in high school, level of math preparation, marital status, number of children, reasons for attending their current college, and length of commute to campus. Two measures of disability, one measure of computer ownership, one measure of English speaking ability, and one measure of place of residence were tested in these analyses as well.

The remaining three variables were factors derived from two principal components factor analyses of 71 items on the TRUCCS baseline survey (each factor analysis used varimax rotation techniques, and items with factor loadings of .35 or below were dropped from the analyses to maximize reliability). These included the following: (a) Academic involvement: interaction with instructors/academic counselors, a 5-item factor that measures how often respondents interacted with instructors and counselors in the past week; (b) Academic involvement: Studying with others, a 5-item factor that measures how often respondents interacted with other students on academic matters in the past week; and (c) Views: Determined and confident, a 10-item factor that measures the degree to which respondents are committed to doing well in school and achieving their goals.

Appendix A provides a complete list of all independent variables and coding schemes; Appendix B describes the items that comprise each factor, and lists factor loadings and Cronbach's alpha values.

RESULTS

Response Rates

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As shown in Table 1, the average response rate across both modes of follow-up survey administration was 23.7%.

This rate is similar to the response rate of 21.5% reported by Sax et al. (2003), who conducted a one-year follow-up study of college students at four-year campuses. However, Sax et al. noted that response rates were *lowest* among students in their sample who comprised the online-only administration group, whereas response rates were *highest* among the online-only administration group in the TRUCCS follow-up sample. In fact, response rates for the online-only group were *double* that of the paper-only group in this study (32.1% versus 15.2%). This difference likely owes to the point that students who returned a follow-up survey via e-mail were those who had provided the TRUCCS project team with a valid e-mail address on the baseline questionnaire in spring 2001. Therefore, the TRUCCS study appears to have avoided one of the pitfalls of many online surveys: low response rates due to incorrect or infrequently used e-mail addresses (as discussed in Sax et al.).

Response rates broken out by gender and race/ethnicity are provided in Table 2.

Regardless of mode of contact, women displayed higher rates of response than did men, a finding consistent with recent research on

Table 1. Response rates to follow-up survey among students in matched sample, by mode of survey administration

	Total number of students contacted	Total number of surveys returned	Response rate
Group A: paper-only	1040	158	15.2
Group B: e-mail-only	1040	334	32.1
Total	2080	492	23.7

Note. Mail-out and respondent samples exclude students who (a) received the survey as a paper and electronic form, (b) did not provide a vaild address at which to contact them for follow-up and/or (c) were contacted by telephone as a late-administration effort to maximize overall response. Online and paper mail-out samples were matched on key variables to compensate for self-selection bias.

Table 2. Response rates to follow-up survey, by survey mode, sex, and race/ethnicity[1]

	Matched mail-out sample					
	Group A: Paper-Only			Group B: Email-Only		
	Total number of students contacted	Total number of surveys returned	Response rate	Total number of students contacted	Total number of surveys returned	Response rate
Sex						
Women	589	114	19.4	631	225	35.7
Men	430	41	9.5	399	108	27.1
Race/Ethnicity						
White/Causasian	176	35	19.9	176	59	33.5
Black/African American	152	34	22.4	152	46	30.3
Mexican/Mex. American	359	39	10.9	359	126	35.1
Latino/a	229	33	14.4	229	70	30.6
Asian	124	17	13.7	124	33	26.6

[1]Mail-out sample counts by sex may not total mail-out sample counts because some respondents did not mark their sex on the survey.

Note. Mail-out and respondent samples exclude students who (1) received the survey as a paper and electronic form, (2) did not provide a valid address at which to contact them for follow-up, (3) were contacted by telephone as a late-administration effort to maximize overall response. Online and paper mail-out samples were matched on key variables to compensate for self-selection bias.

gender differences in response to paper and Web surveys (Sax et al., 2003; Underwood et al., 2000). Interestingly, the gender gap in response rates is narrower in the e-mail administration group than in the paper administration group, suggesting that online survey administration yields a better gender balance among respondents than does paper survey administration. Underwood et al. (2000) also reported a smaller gender gap in Web responses as opposed to paper responses. However, online response rates yielded *larger* gender differences than did paper response rates in Sax et al. Clearly, the jury is still out on precisely how Internet surveys affect the gender balance in respondent pools.

Racial/ethnic differences in rates of response to the e-mail and paper questionnaires are notable. Mexican/Mexican-American students had the lowest rate of response to the paper survey (10.9%) but the highest rate of response to the online survey (35.1%). Asian students—who have demonstrated some of the highest rates of response to paper and e-mail questionnaires (Underwood et al., 2000)—yielded the lowest rate of response to the e-mail survey

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(26.6%) and the second-lowest to the paper survey (13.7%). Conversely, while African American students' response rates are typically among the lowest in college student surveys, these students in fact yielded the highest rate of response to the paper questionnaire (22.4%). Discrepancies between response rates by race/ethnicity in this study and those in other studies might reflect differences in the sample pools (i.e., other studies tend to focus on students at four-year institutions, whereas this study drew from a two-year college sample only).

Nonresponse Bias

Logistic regression analyses conducted for each group identify predictors of response/nonresponse. As discussed in the methods section, these analyses force-entered a common set of independent variables, each of which had predicted response for either the paper-only or e-mail-only samples in an initial set of exploratory logistic regressions. Table 3 provides the logistic regression coefficients, standard errors, and odds ratios for each of the four independent variables that predicted paper or email response.

The logistic regression coefficients signify whether the relationship between a predictor variable and survey response is positive or negative, and they give some indication as to the strength of that association. Odds ratios are somewhat different in that they are centered around 1, with odds ratio greater than 1 indicating that higher scores

Table 3. Predictors of response to follow-up survey, by mode of survey administration

	Logistic regression coefficients and standard errors (in parentheses)		Odds ratios	
Independent variable	**Group A (paper)**	**Group B (e-mail)**	**Group A (paper)**	**Group B (e-mail)**
Sex: Female	.749** (.198)	.291 (.145)	2.115	1.338
Age	.268 (.148)	.383* (.119)	1.307	1.467
Average grade in high school	.122 (.050)	.146** (.037)	1.130	1.157
Plans to transfer to a 4-year college or university	.094 (.215)	.519* (.172)	1.098	1.680
Academic involvement: Studying with others	−.019 (.026)	−.050 (.021)	.982	.952
Constant	**−4.278**** **(.646)**	**−3.663**** **(.501)**	**.014**	**.026**

Note. $^{*}p < .01$; $^{**}p < .001$.

on a predictor variable *increase* the odds of response, and odds ratios less than 1 suggesting that higher scores on a predictor variable *decrease* the odds of response.

A total of five variables emerged as significant predictors ($p < .01$) of follow-up response for either group in the first round of exploratory analyses, four of which remained significant when examined simultaneously in the final analyses. These four variables include gender, age, high school grade point average, and transfer plans. The fact that women were more than twice as likely as men to respond to the paper survey is consistent with women's higher survey response rates reported in other standard mail surveys (Dey, 1997; Sax et al., 2003). As discussed earlier, it is interesting that this pattern did not hold in the online sample, suggesting that the gender gap in response rates may be minimized with the use of online questionnaires.

Among the three variables predicting response to the online survey, planning to transfer to a four-year college or university had the highest odds-ratio. In other words, response to the email survey was more likely from community college students who planned to transfer to a four-year institution. Although this might seem to be a logical predictor of response to a questionnaire about college experiences, it is not clear why transfer plans would relate solely to survey response via e-mail. It is possible that students who intend to transfer spend more time on the Internet (perhaps investigating potential colleges or taking advantage of academic resources on the Web) and, therefore, would be more likely to respond to the online survey than would be students with no transfer aspirations.

Next is the positive effect of age, indicating that older students were more likely to respond to the online survey than were younger students. Previous studies have reported age as a positive predictor of survey response, but these results typically refer to general household surveys (e.g., Lepkowski & Couper, 2002). That age is a predictor of online survey response among college students is a newer finding, since most surveys of college students draw from samples of undergraduates at four-year campuses (wherein the range of student age is fairly narrow). However, it is unclear why age would predict response to the online questionnaire but not the paper questionnaire.

Finally, students who earned strong grades in high school were more likely to respond to the online questionnaire than were students with lower high school grades. The effect of grade point average is not surprising, given prior work that suggests higher-achieving students respond to surveys at higher rates than do their less academically successful peers (Dey, 1997; Sax et al., 2003). Although it is

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somewhat puzzling that grades would predict online response rates, but not paper response rates, it is worth noting that the predictive power of grades nearly reached significance in the paper sample ($p = .015$), indicating that with larger samples this variable would likely predict response to both online and paper surveys.

Despite racial/ethnic differences in rates of response to both paper and online surveys (see Table 2), race/ethnicity was *not* significant in predicting response to either format once gender, age, GPA, and transfer plans were controlled. In other words, differences in rates of response across racial/ethnic groups were accounted for by differences in these students' grades, transfer plans, etc.

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Response Bias

The question of response bias is addressed in Table 4.

Evidence of response bias exists if the item-by-item responses to the mail survey differ significantly from the item-by-item responses to the paper survey. Significant differences between paper and online responses were found for only 7 of the 113 variables examined. The top portion of the table describes those items for which mean responses were higher ($p < .01$) in the paper group than in the e-mail group, whereas the bottom portion of the table lists items for which mean responses were higher among online respondents.

Table 4. Response bias in follow-up data, by mode of survey administration

Variables with statistically significant mean differences by mode ($p < .01$)	Mean of paper respondents (*SD* in parentheses)	Mean of online respondents (*SD* in parentheses)
Paper > Online		
Experience since Jan. 2001: A new full-time job[1]	1.22 (.42)	1.11 (.31)
Experience since Jan. 2001: Marriage[1]	1.10 (.30)	1.03 (.16)
Current religious affiliation: Christian Science[1]	1.05 (.22)	1.00 (.00)
Paper < Online		
Identity: Primarily a parent who is an employee[1]	1.01 (.11)	1.07 (.25)
Degree aspirations[2]	5.47 (1.48)	5.90 (1.18)
Problem in obtaining education: College staff[3]	1.49 (.81)	1.72 (1.06)
Problem in obtaining education: Job responsibilities[3]	2.21 (1.29)	2.60 (1.34)

Note. Means were compared using an independent sample *t*-test. Levene's test was used to determine equality of variances.

[1]Dichotomous variable: 1 = "not marked" 2 = "marked."

[2]Seven-point scale: 1 = "will take classes but do not intend degree" to 7 = "doctoral or medical degree."

[3]Five-point scale: 1 = "not a problem" to 5 = "very large problem."

In nearly all cases, mean differences are fairly small between the two groups. Paper respondents are more likely than are online respondents to have a new full-time job, to be married, and to identify themselves as Christian Scientists. Online respondents are more likely than are paper respondents to identify themselves as working parents (although this category was quite small among both groups, comprising 7% of the online sample and just 1% of the paper sample). Online respondents also report higher degree aspirations than do paper respondents, and report "college staff" and "job responsibilities" as problems in their attempt to get an education. These marginal differences between online and paper respondents do not seem to suggest any distinct patterns in online versus paper responses, at least not enough to raise concerns about aggregating data from both modes of administration.

DISCUSSION

This paper explored three primary questions in a longitudinal study of community college students: (a) Do online surveys yield higher rates of response than do paper surveys? (b) Is the nonresponse bias characteristic of online surveys similar to or different from that of paper surveys? (c) Are there differences between online survey responses and paper survey responses despite identical survey items?

Results indicate that response rates to the online survey were higher than those found for the paper survey regardless of race or gender of respondent. As discussed earlier, the fact that this pattern differs from that reported in recent research on college students is likely attributable to the fact that the online mail-out sample was comprised entirely of individuals who had provided a valid e-mail address on the initial (spring 2001) questionnaire. Clearly, to achieve higher response rates and reduce costs in follow-up surveys, it is wise to collect multiple forms of contact information in the baseline questionnaire or interview. Students who are contacted via valid email addresses are more likely to respond *and* do not incur the expense of being sent a paper questionnaire via standard mail.

When considering predictors of nonresponse, we find that some of the bias traditionally produced in paper surveys is also produced in e-mail surveys, such as age and prior academic achievement. This is important since it indicates that new modes of survey administration may not help us to reach certain groups of students who tend to be underrepresented in more traditional survey formats—most critically, lower-achieving students. However, the study does suggest that online methodologies yield more balanced samples with respect to gender.

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On the issue of response bias, there was surprisingly little difference in student responses to the items in the paper and e-mail surveys. This is certainly good news for those engaged in the administration of both online and standard mail questionnaires, since it suggests that we can safely aggregate data from both modes of administration if online and paper mail-out samples are equivalent. This caveat is critical, since this study took great pains to identify and eliminate differences between those who received the online versus the paper questionnaire. In the real world, where some students will self-select into an e-mail sample by virtue of their providing a valid e-mail address in initial data collection, sampling biases are unavoidable. Researchers interested in combining responses to Web and paper surveys are therefore encouraged to (a) select comparable paper and e-mail samples a priori, or (b) conduct post hoc comparisons of differences between online and paper mail-out samples and consider whether analyses should be run on matched samples only.

In sum, this study suggests that online survey methodologies may be a more effective mode of reaching community college students than paper surveys sent via standard mail if one has valid e-mail contact information. In that sense, the study provides evidence of the value of collecting both mailing address and e-mail address at the point of initial contact with the student. Further, results suggest that data collected via paper and online methodologies may be safely aggregated, assuming comparability between paper and online mail-out samples.

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Appendix A. Variable list and coding schemes

Variables	Coding scheme
Dependent variables	
Paper response (among students in Group A)	Dichotomous variable: 0 = "no," 1 = "yes"
E-mail response (among students in Group B)	Dichotomous variable: 0 = "no," 1 = "yes"
Independent variables	
Sex: Female	Dichotomous variable: 1 = "male," 2 = "female"
Race/Ethnicity: White/Caucasian	Dichotomous variable: 1 = "not marked," 2 = "marked"
Race/Ethnicity: Black/African American	Dichotomous variable: 1 = "not marked," 2 = "marked"
Race/Ethnicity: Mexican/Mexican American	Dichotomous variable: 1 = "not marked," 2 = "marked"
Race/Ethnicity: Latino/a[1]	Dichotomous variable: 1 = "not marked," 2 = "marked"
Race/Ethnicity: Asian[2]	Dichotomous variable: 1 = "not marked," 2 = "marked"
Age	3-point scale: 1 = "20 or younger" to 3 = "40 or older"
Average income	14-point scale: 1 = "less than $6,000" to 14 = "$200,000 or more"
Current marital status	Dichotomous variable: 1 = "not married," 2 = "married"
Number of children	Dichotomous variable: 1 = "none," 2 = "1 or more"
Plan to attend the same college next semester	Dichotomous variable: 1 = "no," 2 = "yes"
Number of other colleges/universities attended	3-point scale: 1 = "none" to 3 = "2 or more"
Plans to attend a four-year college or university	Dichotomous variable: 1 = "definitely not," "probably not" or "maybe," 2 = "probably" or "definitely"
Hours per week: Work at a job	9-point scale: 1 = "0, none, or didn't have time" to 9 = "46 hours or more"
Hours per week: Do housework or childcare	9-point scale: 1 = "0, none, or didn't have time" to 9 = "46 hours or more"
Hours per week: Spend time on this campus (including time in class)	9-point scale: 1 = "0, none, or didn't have time" to 9 = "46 hours or more"
Obstacle to education: Understanding the English language	9-point scale: 1 = "not a problem" to 5 = "very large problem"
Length of commute to campus	6-point scale: 1 = "less than 15 minutes" to 6 = "more than 2 hours"
Disability: Mobility impaired	Dichotomous variable: 1 = "not marked," 2 = "marked"

(*Continued*)

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Appendix A. Continued

Variables	Coding scheme
Disability: Attention deficit disorder	Dichotomous variable: 1 = "not marked," 2 = "marked"
Average grade in high school	9-point scale: 1 = "D or lower (Poor)" to 9 = "A or A+ (Extraordinary)"
Level of math preparation	7-point scale: 1 = "basic math/business math/pre-algebra" to 7 = "calculus"
Live alone while attending this college	Dichotomous variable: 1 = "not marked," 2 = "marked"
Own a computer with Internet access	Dichotomous variable: 1 = "no," 2 = "yes"
Reason for attending this college: Something to do	2-item composite measure:
Reason: I couldn't find a job	7-point scale: 1 = "very unimportant" to 7 = "very important"
Reason: I couldn't find anything better to do	7-point scale: 1 = "very unimportant" to 7 = "very important"
Academic involvement: Interaction with instructors/academic counselors	5-item factor—see Appendix B
Academic involvement: Studying with others	5-item factor—see Appendix B
Views: Determined and confident	10-item factor—see Appendix B

[1]Includes South American, Central American, and other Latino/Hispanic.
[2]Includes Chinese, Japanese, Korean, Thai, Laotian, Cambodian, and Vietnamese.

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Appendix B. Factors: loadings, coding schemes, and Cronbach's alphas

Factor	Loading
Academic involvement: Interaction with instructors/academic counselors ($\alpha = .73$)	
Class-related activity in past week (for all courses): Talk with an instructor before or after class[1]	.74
Class-related activity in past week (for course in which student completed survey): Ask the instructor questions[1]	.73
Class-related activity in past week (for all courses): Talk with an instructor during office hours[1]	.65
Class-related activity in past week (for course in which student completed survey): Speak up during class discussions[1]	.64
Class-related activity in past week (for all courses): Speak with an academic counselor[1]	.53
Academic involvement: Studying with others ($\alpha = .72$)	
Hours per week: Study with students from this course[2]	.75
Class-related activity in past week (for all courses): Study in small groups outside of class[1]	.70
Class-related activity in past week (for course in which student completed survey): Telephone or email another student to ask a question about your studies[1]	.59
Hours per week: Study with students from other courses (not this course)[2]	.56
Class-related activity in past week (for all courses): Help another student understand homework[1]	.39
Views: Determined and confident ($\alpha = .83$)	
View: I expect to do well and earn good grades in college[3]	.70
View: Understanding what is taught is important to me[3]	.68
View: I feel most satisfied when I work hard to achieve something[3]	.67
View: I am very determined to reach my goals[3]	.66
View: I keep trying even when I am frustrated by a task[3]	.66
View: It is important to me to finish the courses in my program of studies[3]	.64
View: Success in college is largely due to effort (has to do with how hard you try)[3]	.61
View: I enjoy doing challenging class assignments[3]	.55
View: I always complete homework assignments[3]	.54
View: I know I can learn all the skills taught in college[3]	.52

[1]6-point scale: 1 = "0, or didn't have time" to 6 = "5 or more times".
[2]9-point scale: 1 = "0, none, or didn't have time" to 9 = "46 hours or more".
[3]7-point scale: 1 = "Strongly disagree" to 7 = "Strongly agree".

Note. Students' raw scores on items to comprise each factor were summed to compute factor scores. In the event that items within a factor were scaled differently (e.g., the items in "Academic involvement: Studying with others"), students' scores were standardized and then summed to compute factor scores. Means of individual items were replaced before computing factor scores.