



Working Paper:

Parental Influences on Postsecondary Decision-Making: Evidence from a Text Messaging Experiment

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A growing body of research points to the importance of increasing parental engagement in their children's education. Yet, little research has investigated whether prompting parents to be more involved in the college process leads to improved student outcomes. We investigate, through a large-scale experiment, whether providing both students and their parents with personalized information about tasks students need to complete in order to enroll in college leads to improved college enrollment outcomes relative to providing information to students only. We utilize text messaging as a vehicle for providing information and one-on-one college advising to students and parents. Across treatment arms, the text outreach increased on-time college enrollment by a statistically significant 3.1 percentage points. We do not find compelling evidence that texting both parents and students increased the efficacy of the outreach relative to just texting students. We discuss this result in the context of the broader parental engagement literature.

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**PARENTAL INFLUENCES ON POSTSECONDARY DECISION-MAKING:
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Introduction

Substantial disparities exist across socioeconomic lines in how parents allocate their time with their children. Parents from higher socioeconomic backgrounds spend more time overall with their children—45 minutes more per day, on average, which enhances cognitive development (Putnam 2015). Higher-socioeconomic status (SES) parents also spend more time organizing leisure and enrichment activities and engaging in educational and extracurricular activities with their children (Lareau 2011; Sayer, Bianchi, and Robinson 2004). These disparities—which have widened over time—may contribute to persistent socioeconomic inequalities in both academic achievement and attainment (Bailey and Dynarski 2011; Reardon 2011)

Over the last several years, researchers have rigorously evaluated the efficacy of interventions aimed at better informing parents about their children’s education and encouraging parents to be more actively involved. In one study, parents of preschool-age children received text messages with concrete pre-literacy strategies they can practice at home (York and Loeb 2014). In another, Bergman (2015) drew on information available in online gradebooks to provide parents personalized information about assignments their children needed to complete. Both interventions resulted in substantial improvements in children’s cognitive performance or academic achievement, at the cost of only a few dollars per student. Kraft and Rogers (2015) focused on the framing of information sent to parents and found that emphasizing what students need to improve rather than where they are excelling leads to heightened parental involvement and improved student performance. Finally, in a pilot intervention focused on reducing chronic absenteeism in pre-school and early elementary school, Page and Smythe-Leistico utilized text-based outreach to parents to encourage daily attendance, provide parents with feedback on their child’s attendance to date, and provide support to families in managing challenges they were facing and that threatened their ability to get their child to school regularly (Smythe-Leistico and Page 2015; Page and Smythe-Leistico in progress).

These field experiments evaluated interventions to improve parental involvement in education across the pre-K through grade 12 years. In contrast, comparatively fewer rigorously evaluated interventions have focused on informing parents about key stages in the college and financial aid application process. This is despite a large body of research documenting that low-

income students have difficulty navigating the complexity of college and financial aid decisions, and as a result may not apply to colleges that are well-matched to their academic abilities; may not apply for financial aid for which they would be eligible; and may fail to successfully matriculate in college even if they have been accepted and chosen where to enroll (Bettinger, Long, Oreopoulos, and Sanbonmatsu 2012; Bowen, Chingos, and McPherson 2009; Castleman and Page 2014; Dynarski and Scott-Clayton 2006; Hoxby and Avery 2012; Hoxby and Turner 2013; King 2004; Kofoed 2014).

Existing research does point to the potential importance of actively encouraging parents to engage in their child's college-going process. In one effort, the College Board distributed information about college net price to low-income families of middle school students. Follow-up surveys administered to treatment and comparison families revealed that those receiving the brochure were more likely to report knowing the cost of attending college in their state (College Board 2012). In another, providing families with support in filing the FAFSA at the time of tax preparation had positive and significant impacts on student receipt of financial aid, college enrollment and college persistence (Bettinger et al. 2012).

Despite the success of these efforts, college-going interventions more typically focus on providing services and supports to students only (see Page and Scott-Clayton 2016 for a recent review). Yet, interventions that provide parents of low-income students with personalized college and financial aid information as well as access to professional advising may be important for several reasons (Hamilton forthcoming). For many students, parents are integral to students' decisions about where to apply and enroll in college. Further, at some stages in the college-going process, such as applying for financial aid, students are literally dependent on their parents' involvement and information (Lareau 2011; McDonough 1997; Myers and Myers 2015). Lower-SES parents, however, tend to be less involved in their children's college decisions and in completing key stages of the application process (Grodsky and Jones 2007; Lareau 2011). While high schools attempt a variety of strategies to engage parents around college and financial aid, parent participation is often low. This may be because parents lack trust in or feel unwelcome at their child's school, because parents are hesitant to share financial information with school-based personnel, or because they are attending to competing, more acute demands (Hanafin and Lynch 2002; Horvat, Weininger, and Lareau 2003; Mullainathan and Shafir 2013).

At the same time that greater parent involvement has the potential to benefit students, there are also reasons why proactive efforts to increase parent engagement in the college process may have a limited, or even negative, effect. One possibility is that the intra-family dynamic in lower-income

or first-generation college families is for the parent to defer to their child for guidance on how to be involved (Auerbach 2006, 2007). Parental interventions like the ones described above may have limited impact if this existing dynamic is well established. Another possibility is that students—particularly first-generation college students—find other sources of college counseling and advice (Lareau 2011). Proactively reaching out to parents to encourage them to be involved in the college process has the potential to disrupt the existing advising relationships that students have established, and to diffuse the locus of responsibility for who within the family is primarily in charge of completing important college and financial aid tasks. This raises the question of whether nudging parents to be more involved in the college process will necessarily generate improved outcomes for students.

In this paper we make several primary contributions to the literature on parent involvement in education. We investigate, through a large-scale randomized controlled trial (RCT), whether providing both students and their parents with personalized information about tasks the student needs to complete in order to enroll in college leads to improved college enrollment outcomes relative to providing information to students only. We utilize text messaging as a vehicle for providing information and inviting the opportunity to communicate with a college advisor to both students and parents. While students may be more accustomed to text-based communication, it may remain comparatively innovative in communication directed to parents. This outreach strategy may overcome trust and discomfort barriers associated with parents having to engage directly with their child's school, and builds on prior work showing that parents respond positively to text-based outreach (Bergman 2015; Kraft and Rogers 2015; Smythe-Leistico and Page 2015; York and Loeb 2014). As a secondary contribution, we replicate results from earlier personalized messaging experiments that targeted college-intending students with college and financial aid information (Castleman and Page 2015). Importantly, the current replication provides evidence that our earlier results are robust both to a different time period and to additional geographic locations.

We conducted the experiment on which we report in partnership with uAspire, a national non-profit focused on college affordability and financial aid advising. uAspire operates direct service sites in five cities in Massachusetts and three cities in the California Bay Area. Direct student services include support to complete the FAFSA and investigate affordable postsecondary options. uAspire also operates a college affordability Training and Technical Assistance program for practitioners nationwide. In Boston, Lawrence, and Springfield, MA, we randomly assigned 3,906 high school graduates with whom uAspire worked during high school and who planned to enroll in college in

the fall to one of three experimental groups. In one group, students and parents received 14 text messages during the summer to remind them of tasks required to successfully matriculate in college. These messages were personalized where possible to students' intended college; included web links so that students could complete tasks in the moment if they had a smart phone; and invited students and parents to write back if they needed help from a uAspire advisor. Those who responded were then able to interface with a uAspire advisor via text. In the second group only students received the text messages. The third group served as the control, and did not receive texts. In Fall River, MA and Miami, FL, we randomly assigned 848 students to one of two groups: the student-only treatment group or the control group.¹

To preview our results, we find that, across treatment arms, the text message outreach increased on-time college enrollment by a statistically significant 3.1 percentage points, with this effect evenly divided between increased enrollment at four- and two-year institutions. The magnitude of the effect was similar, and not statistically distinguishable, between the students and parents and students-only treatment groups. Consistent with our prior experimental evidence, we find that the effects of the outreach were particularly pronounced for low-income and first-generation college-going students. Somewhat surprisingly, we find suggestive evidence that, for first-generation students, also messaging parents attenuated the effect of the intervention, with enrollment impacts for the students and parents group smaller than for the students-only group and not statistically distinguishable from zero. In the discussion section of the paper we explore potential hypotheses for how messaging parents could have diminished the effect of the text campaign for students.

We structure the paper as follows. In Section II, we provide additional background on uAspire and its prior work providing post-high school summer support to would-be rising college freshmen. In Section III, we detail our research design. In Section IV, we present our results. Finally, in Section V, we discuss key findings and why sending text-based outreach to parents may not have led to improved student outcomes in this particular context.

¹ While the Boston, Springfield and Lawrence sites were more established and had participated in prior text messaging interventions, the Fall River and Miami sites were new. These sites decided that they were not able to take on messaging to parents as well as students and therefore opted to engage in the student treatment group exclusively.

Background

uAspire is a national non-profit that provides financial aid advising and training and technical assistance related to college affordability to other practitioners and educational agencies.² uAspire is headquartered in Boston, Massachusetts, where it operates a high school advising program that provides support to students to complete the financial aid application process, including the and FAFSA and CSS/Profile, compare and contrast financial aid award offers and navigate the financial aspects of college decision making. uAspire takes a whole-district approach to advising, and stations advisors in most of the high schools in the school districts where it operates. This provides uAspire with reach to the majority of college-intending high school seniors within a district.

Beginning in summer 2011, we partnered with uAspire to extend its advising model into the summer after high school. In an RCT, we assigned college-intending high school seniors either to a control group that did not receive additional outreach or to a treatment group in which students received individualized outreach and the offer of support from a uAspire advisor. Advisors spent approximately 2 – 3 hours with treatment students over the summer, offering assistance with financial aid applications, procedural tasks like registering for orientation and placement tests, and selecting tuition payment options. This summer assistance led to substantial improvements not only in whether treated students enrolled in college but also whether they persisted into their sophomore year (Castleman, Page, and Schooley 2014).

Two key insights emerged from this experiment: first, advisors were investing much of their time just trying to get in contact with and schedule meetings with students, and second, advisors were most successful in reaching students via text messaging and Facebook messaging in contrast to more conventional means of contact, like phone and email. Drawing on these findings, in the next summer (summer 2012), we partnered with uAspire to design, implement, and evaluate through an RCT a large-scale texting campaign in which we sent students ten text messages that provided them with personalized guidance of tasks they had to complete at their intended college or university. The texts included customized links where students could complete or learn more about college-specific tasks, and invited students to write back if they needed help from a uAspire advisor. Of students assigned to the treatment group, we had cell phone numbers (and thus were able to text) approximately 63 percent of students. For 35 percent of students, we had cell numbers for their

² For more information on uAspire, see www.uAspire.org.

parents and included them on the texts as well. In total, for 71 percent of students in our treatment group, we were able to message a student, a parent or both. However, because we did not randomly assign whether just students or students and parents received texts, we could not disentangle in this experiment the added benefit of including parents in the campaign. Nonetheless, we found that the text campaign increased on-time enrollment by up to seven percentage points, with effects largest among sub-populations with the least access to college and financial aid information and assistance (Castleman and Page 2015).

Our current study builds on this foundation by isolating, through a multi-arm RCT, the added benefit, if any, of providing the same information about required college and financial aid tasks to parents that we provided to students. Our paper is organized around the following research questions:

1. Does an automated and personalized summer text messaging campaign, which informs students of required college tasks and offers to connect them to professional college-going assistance, increase the probability that students enroll and attend college during the fall semester immediately after high school graduation?
2. Are the effects of these text messages greater if students' parents also receive the text messages?
3. Are the results of the current texting experiment consistent with findings from a prior summer text messaging campaign conducted in partnership with uAspire?

Research design

Sites

We conducted this investigation in the summer of 2014 in five uAspire sites, including four in Massachusetts and one in Florida. Among the Massachusetts sites, those in Boston, Springfield and Lawrence are well established and have partnered with us in prior summer transition interventions. In contrast, this summer represented the first in which uAspire worked with students in Fall River, Massachusetts. Similarly, it was the first summer that uAspire advisors worked with students in Miami, Florida. Towards the end of students' senior year of high school, uAspire surveys graduating seniors who were served by uAspire on their college plans. The survey also collects student and parent cell phone numbers, which are initially recorded during uAspire's programmatic intake process in the fall of senior year and may have changed during the course of the school year.

Data and sample

We utilize data from three primary sources. First, uAspire provided us with student-level demographic and prior-achievement information on the class of 2014 high school seniors with whom they worked during the 2013-14 school year. For these students, uAspire provided information such as gender, race / ethnicity, parental education (from which we derived an indicator for first-generation college-goer status), expected family contribution (EFC) to the cost of college as calculated upon completion of the FAFSA, and a categorical measure of high school GPA. Second, from Signal Vine, our text message platform, we obtained de-identified transcripts of all text-based communications between advisors and students, including both the pre-scheduled, automated outreach messages students received as well as all student and advisor communication that followed. Third, uAspire obtained student-level college enrollment outcomes from the National Student Clearinghouse, a non-profit organization that maintains postsecondary enrollment records at approximately 96 percent of colleges and universities in the U.S.³

Across the five sites, our experimental sample includes 4,754 college intending class of 2014 high school seniors. In Table 1, we present descriptive statistics for these students. As shown, the students in this investigation are primarily non-white; 48 percent of students are of Hispanic origin, and another 33 percent of students in the sample are black. As in our previous interventions (Castleman, Owen, and Page 2015; Castleman et al. 2014; Castleman and Page 2014, 2015, 2016) and in line with national trends (Goldin, Katz, and Kuziemko 2006), students in our sample are more likely to be female than male. Among those students for whom uAspire was able to record information on parental education, nearly half are would-be first-generation college-goers, and over 60 percent of students have an expected family contribution to the cost of college of zero and are, as a result, eligible for the maximum Pell Grant award.⁴ Taken together, the college-intending students served by uAspire are those who, based on their socio-demographic characteristics, are more likely to struggle along several dimensions in navigating the college-going process, including the summer transition to college (Page and Scott-Clayton 2016).

³ NSC coverage rates vary considerably by state. Fortunately, the coverage rates are fairly high in Massachusetts (95.1 percent as of 2011), where the majority of students in our experimental sample attend college (Dynarski, Hemelt, and Hyman 2015).

⁴ Of course, students with a non-zero but low EFC also qualify for Pell Grant funds below the maximum level allowable. For more information on the determination of Pell Grant awards, see <https://ifap.ed.gov/dpccletters/attachments/GEN1502Attach.pdf>.

Intervention design

The core of the text campaign was a series of 14 automated messages to remind students of tasks they had to complete to successfully matriculate in college. The messages reminded students to: log on to their intended college’s web portal to access important paperwork; register for orientation and placement tests; complete housing forms; and sign up for or waive health insurance, if relevant. The messages also offered students help completing the FAFSA, in case they had not done so already, and interpreting their financial aid award letter and tuition bill from their intended college. Most messages included web links that allowed students with smart phones and data plans to complete tasks directly from their phone. uAspire advisors were the ostensible senders of the messages, though the messages themselves were sent via an automated text message platform, Signal Vine.⁵ When student or parent recipients responded to a text message, advisors were able to log on to the Signal Vine platform, view student responses, and follow up to provide additional, one-on-one assistance. The text messages were delivered between late June and mid-August in approximately five-day intervals. Parent message content largely mimicked the content students received. For instance, the message reminding students to register for freshman orientation read as follows:

“Hi, it’s uAspire. Have u signed up for [***College_Abbrev***] orientation? Space is limited – get your spot. Registration info: [***Orientation URL***]. Text for help.”

The message to parents was only slightly modified:

“Hi, it’s uAspire. Has [***Student_first_name***] signed up for [***College_Abbrev***] orientation? Space is limited. Registration info: [***Orientation URL***]. Text for help.”⁶

We refer readers interested in the remainder of the text message content directly to uAspire.

Randomization

In preparation for randomization, we first assigned each student in the sample to a participating uAspire advisor within their site. We primarily matched students to the uAspire advisor with whom they worked during the academic year, but some students were assigned to new advisors, in cases where their school-year advisor was not staffing the summer outreach. Across the sites, 15 advisors in total staffed the intervention.

⁵ For more information on Signal Vine, please visit www.signalvine.com

⁶ The bolded and italicized fields were customized to students’ intended college, drawing on information uAspire assembled from college websites. Students planning to attend a less common institution or who did not report a specific intended institution received a generic set of reminders.

Within advisor groups in Boston, Springfield and Lawrence, we randomly assigned students to one of three treatment arms: student-only outreach; student and parent outreach; or control. Within advisor groups in Fall River and Miami, we assigned students either to the student-only outreach or to control, as described above. In Table 2, we report site-by-treatment group sample sizes. Sample sizes are not perfectly balanced across experimental groups, given that the allocation of students to treatment groups depended both on the size of advisors' school-year caseloads as well as each participating advisor's constraints and capacity to provide summer support.

In Tables 3 and 4, we assess the baseline equivalence of the treatment and control groups. In Table 3, we present regression coefficients obtained by regressing baseline covariates on the pair of indicators for assignment to the student only and student and parent treatment groups. These regression models include fixed effects for advisor groups to account for the structure of the randomization. The Table 3 results provide indication of good balance in observable characteristics across the experimental groups. We observe significant differences in only two baseline characteristics. First, students in both experimental groups were modestly more likely to have high school GPAs below 2.0. Second, students assigned to the parent and student outreach group were modestly less likely to have completed the FAFSA prior to the start of the intervention. Since these are the only differences detected among the many tests we conducted, and the fact that the direction of these differences would, if anything, likely lead to an attenuation of impacts, we judge them not to be of concern.

To provide a further check beyond these individual tests for baseline equivalence, we additionally ran tests to assess balance on covariates jointly (Hansen and Bowers 2008). Using this methodology, we tested differences between each treatment group and the control group as well as differences between the two treatment groups. We report p-values associated with these omnibus tests in Table 4 for the sample overall and for subgroups defined by having an EFC of zero and having first-generation college-goer status. For the sample overall and for the subsample of students with an EFC of zero, we find no evidence of baseline imbalance. For the subgroup of first-generation college-goers, we detect modest imbalance when comparing the student only treatment group to the control group ($p < 0.10$), although this could be a spurious finding due to multiple testing. In subsequent tables, we present covariate controlled impacts both because of these scattered instances of potential imbalance and because our power calculations assumed our ability to explain outcome variation by controlling for predictive student characteristics.

Measures

We focus our examination on the impact of summer outreach on college enrollment in the fall semester following high school graduation. Therefore, our key outcomes are binary indicators for whether students enrolled in any college, and whether students enrolled specifically in a two-year or four-year institution, to observe whether summer outreach was particularly impactful on whether students enrolled in one sector over the other. Importantly, because our enrollment data comes from the National Student Clearinghouse, we are able to access college enrollment records for students regardless of their treatment assignment or their level of engagement with the intervention. Therefore, attrition does not pose a threat to the validity of our findings.

The explanatory variables of primary interest are indicators for the experimental group to which each student was assigned. As noted above, we incorporate the academic and demographic covariates described in Table 1 in our analyses to increase precision of our estimates. We include indicators for missingness for covariates with missing values and fixed effects for the advisor group to which we assigned each student and within which we conducted the randomization.

Empirical strategy

To assess the impact of the student and parent and student-only outreach on timely college enrollment, we utilize linear probability models.⁷ We focus on Intent-to-Treat (ITT) estimate, given that while we are able to observe whether and the extent to which students and parents engage with the text messages, we cannot observe how the text outreach influences college preparatory behavior of those who receive the text messages but do not actually respond. The models that we fit are of the following general form:

$$COLLEGE_{ij} = a_j + \beta_1 STUDENT_ONLY_{ij} + \beta_2 STUDENT_PARENT_{ij} + \mathbf{X}_{ij}\boldsymbol{\gamma} + \varepsilon_{ij} \quad (1)$$

where a_j represents a vector of fixed effects for uAspire advisor; $STUDENT_ONLY_{ij}$ is an indicator for student i in advisor group j being assigned to the student-only texting group; $STUDENT_PARENT_{ij}$ is an indicator for student i in advisor group j being assigned to the student and parent texting group. X_{ij} is a vector of student-level covariates; and ε_{ij} is a residual error term. Our estimates of the β_1 and β_2 coefficients indicate whether targeting students only or students and parents together for summer outreach via text message increases college attainment relative to those students not targeted for text-based outreach. We then utilize a post-hoc F-test on the β_1 and β_2

⁷ We also assessed the sensitivity of our results to model choice by refitting all outcome models utilizing a probit specification. We find that results are consistent across specifications (results available upon request).

coefficients to indicate whether messaging to parents relative to messaging students only leads to a meaningful in the college going outcomes considered here.

Results

We begin, in Table 5, by presenting information on intervention take up for students (columns 1 – 4) and for parents (columns 5 – 8). First, nearly all students targeted for the intervention received text-based outreach. The intervention was successful in reaching nearly all students targeted for outreach. Across both active treatment arms, approximately one-third of students replied to at least one message, with a very small share of students opting out. Across all students in the treatment group, the average number of incoming text messages was nearly 2. Scaled by the share of students who replied at all, this translates to an average of 5 to 6 messages sent by active students. The most active student sent a total of 65 text messages throughout the summer.

In contrast, parent participation rates were lower. We successfully reached half of parents assigned to the student and parent messaging group, and nearly 18 percent of all parents replied to at least one text message, and the average parent sent one incoming message. Interestingly, these figures reflect a similar rate of engagement as for the students in the intervention, when scaled by the share of parents we were able to message successfully. Finally, the rate of parental opt-out was similarly low.

In Table 6, we present evidence on the impact of text-based outreach on students' on-time college enrollment outcomes. In the top panel of Table 6, we first examine the pooled impact of being assigned to either treatment group, relative to outcomes for the control group. Here, we observe that being assigned to receive text-based outreach either solely or together with one's parent improves rates of on-time postsecondary enrollment by 3.1 percentage points, relative to a control group enrollment rate of 65 percent. Therefore, while large shares of college-intending students in both the treatment and control groups are failing to transition to college, timely enrollment is significantly improved by the text-based outreach. This impact is fairly evenly divided between improved enrollment in the two-year and four-year sectors.

In the bottom panel of Table 6, we present effects separately for the two experimental groups in order to examine whether messaging to parents in addition to students leads to a more sizeable improvement in timely enrollment. Surprisingly, we find effects of very similar magnitude for both treatment groups with no evidence that messaging to parents yielded additional benefit. Specifically, we estimate a treatment effect of 2.9 percentage points in the student-only group and of

3.2 percentage points in the student and parent messaging group. Both of these treatment effects are significant at the $p < 0.10$ level but do not differ from each other in magnitude.

Tables 7 and 8 follow an analogous structure to Table 6, with effects disaggregated according to whether students have an EFC of zero (in Table 7) and whether students are would-be first-generation college goers (Table 8). Based on the pooled results, the text-based outreach improved timely enrollment for the lowest income students in our sample by nearly 6 percentage points. For these students, outreach improved enrollment particularly at two year institutions. Similarly, outreach improved timely enrollment for first-generation college-goers by approximately 5 percentage points, with enrollment impacts concentrated at four-year institutions. For the first-generation college-goers, we observe a potentially counter-intuitive result that impacts are large and positive when outreach is directed to students exclusively but small and indistinguishable from zero when directed to both students and parents together. These differences are not estimated with great precision, so we view these as suggestive patterns. In the discussion section we explore hypotheses for why texting parents may have attenuated the impact of the intervention.

We observe no benefits, on average, of the outreach for students with a non-zero EFC or for students who are not the first in their family to attend college. In sum, as with prior studies, we find that effects of summer transitional outreach and support are particularly sizeable for those students whom we hypothesize have the least access to college planning supports.

Discussion

Consistent with our prior summer melt texting research (Castleman and Page 2015), our results demonstrate that low-cost, behaviorally informed outreach to students during critical junctures in their educational trajectories can generate substantial improvements in college enrollment, with effects greatest among sub-populations with less access to information or advising about college and financial aid. Unlike prior parental engagement research, however, which has found that implementing behaviorally-informed messaging campaigns to increase parents' awareness of their child's performance in school leads to improved student performance (e.g., Bergman 2015; Kraft and Rogers 2015; Smythe-Leistico and Page 2015), we do not find added benefit of texting parents about tasks their child is required to complete during the summer months. This is surprising, given that students are often still reliant on their parents for help with important pre-matriculation tasks, such as evaluating supplementary loan offers, including Parent Plus loans which parents have to apply for, and paying college tuition bills. Many students are also reliant on their families for

transportation to college. For the students served in our intervention, this was not always possible. For example, even when students' families owned a car, the car was otherwise needed for parental transportation to work.

One possibility for why messaging parents during the summer after high school may have little impact is that parents were simply passing the message content on to their children without actively engaging with them in the tasks on which the messages were designed to prompt action. This may be particularly likely for parents of lower-income and less-educated backgrounds, for whom college and financial aid literacy and overall involvement in college planning may have been lower. Parents serving as conduits of messages may have added little value above and beyond sending students the text messages directly. Anecdotal feedback from uAspire on how parents interacted with the message content lends support for this hypothesis. For example, some parents would reply with messages such as "Can you send this to [my child] instead?" or "This is his mother. His number is [XXX]". Other students reported independently that their parent did not know how to text.

Another possibility is that students were skeptical about their parents' ability to be helpful with college, or of the extent to which parents had sufficient knowledge about the tasks that needed to be completed (Stanton-Salazar 2001). Even if the texts prompted parents to follow up with their child about important tasks, students may have been less responsive to this offer of help. It is also possible that, over the course of the college and financial aid application process, a child-parent dynamic had formed where parents waited for cues from their child for how to be involved (Auerbach 2006, 2007), or parents may view these tasks as a "rite of passage" for students to navigate on their own. The text messages to parents may not have been sufficient to disrupt this existing dynamic.

A final possibility is that messaging to students and parents was not sufficiently differentiated and targeted towards their specific motivations and vantage points. Rather, messages sent to students and their parents were quite similar. It may be more effective to target parents with messaging that is more directive on the role that they might play beyond checking in on the tasks that students needed to complete.

While these explanations provide some insight into why messaging parents did not lead to improved rates of college enrollment, they do not address why we observe suggestive evidence that texting parents of first-generation students may have actually diminished the impacts of the intervention. One possibility is that messaging parents may have interrupted the existing locus of

responsibility for completing college-related tasks. Prior research highlights that first-generation students, in the absence of familial-based experience navigating college and financial aid applications, take on more independence with college planning and seek out guidance and support from extra-familial resources like teachers and counselors (Lareau 2011). By messaging parents and encouraging their involvement, we may have inadvertently prompted a diffusion of responsibility around important college-related tasks. That is, students who otherwise would have taken action to complete pre-matriculation requirements now looked to their parents to provide guidance and to be involved. We find some support for this in the interaction data. First-generation students in the student-only group were more likely to respond to messages we sent than were students in the students and parents group (15.5 percent versus 11.5 percent). Another possibility is that parents of first-generation students had mixed feelings about their child going off to college, and that by regularly messaging them about college-related tasks, we were unintentionally bringing to top of mind anxieties or concerns parents had about their child matriculating in the fall (Auerbach 2007). This may have been particularly salient for Latino parents, who comprise 52 percent of the first-generation families in our sample. Prior research has found that Latino parents tend to prefer their children stay closer to home for college (Ovink and Kalogrides 2015; Turley 2006). Specific to the context of the summer after high school, earlier research demonstrates how parental ambivalence during the summer months about students' postsecondary intentions can affect whether and where students enroll in college (Arnold et al. 2009).

This discussion highlights the importance of additional research to investigate the changing dynamic of child and parent decision making over students' educational life cycle. In terms of postsecondary planning, parents often have strong influences on their children's decisions. At several stages, such as completing financial aid applications, students typically cannot proceed without their parents' active involvement. Nevertheless, prior research demonstrates that for some students, especially those who are first in their family to pursue college, parents are not actively engaged in the process. Given broad policy goals to improve college enrollment and completion rates for lower-income and first-generation students, it is essential to better understand parents' roles in these processes, and to continue developing effective and scalable strategies for helping students and families make active and informed decisions about postsecondary pathways that position students for longer-term well-being and success.

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Table 1. Descriptive statistics

Student characteristic	Mean	N
White	0.102	4252
Black	0.329	4252
Hispanic	0.477	4252
Asian	0.072	4252
Multiracial	0.030	4252
Other ethnicity	0.039	4252
Female	0.572	4754
First generation	0.494	2930
EFC of zero	0.630	3192
FAFSA completed	0.747	4754
GPA < 2	0.164	1656
GPA 2 - 3	0.394	1656
GPA 3+	0.442	1656
Mother's education: less than high school	0.143	3430
Mother's education: high school / GED	0.503	3430
Mother's education: college +	0.354	3430

Source: uAspire administrative records

Table 2. Distribution of students by site and experimental group

Site	Control	Student only outreach	Student & Parent outreach	Total
Boston, MA	678	853	860	2,391
Fall River, MA	101	175	0	276
Lawrence, MA	265	150	148	563
Springfield, MA	239	359	354	952
Miami, FL	375	197	0	572
Total	1,658	1,734	1,362	4,754

Table 3. Assessing balance on baseline covariates

	Female	White	Black	Hispanic	Asian	Multi-racial	Other ethnicity	First generation
Student only	-0.019 (0.017)	-0.018 (0.011)	-0.016 (0.017)	0.018 (0.017)	-0.007 (0.009)	0.005 (0.007)	0.009 (0.007)	0.018 (0.022)
Parent & Student	-0.016 (0.019)	-0.01 (0.012)	-0.009 (0.018)	0.011 (0.018)	-0.016 (0.011)	0.002 (0.007)	0.003 (0.008)	-0.003 (0.024)
Intercept	0.583*** (0.012)	0.111*** (0.008)	0.338*** (0.012)	0.468*** (0.012)	0.079*** (0.007)	0.027*** (0.004)	0.035*** (0.005)	0.489*** (0.016)
N	4754	4252	4252	4252	4252	4252	4252	2930
R ²	0.006	0.035	0.1	0.182	0.043	0.01	0.031	0.033

	EFC of zero	GPA < 2	GPA 2 - 3	GPA 3+	FAFSA	Mother's education < HS	Mother's education = HS / GED	Mother's education = college+
Student only	-0.022 (0.020)	0.051* (0.021)	-0.009 (0.030)	-0.042 (0.030)	-0.004 (0.015)	-0.004 (0.014)	0.028 (0.021)	-0.024 (0.020)
Parent & Student	0.019 (0.022)	0.057* (0.023)	-0.029 (0.031)	-0.028 (0.032)	-0.032* (0.016)	0.007 (0.016)	-0.001 (0.023)	-0.005 (0.021)
Intercept	0.632*** (0.015)	0.126*** (0.015)	0.407*** (0.022)	0.467*** (0.022)	0.758*** (0.011)	0.143*** (0.010)	0.493*** (0.015)	0.364*** (0.014)
N	3192	1656	1656	1656	4754	3430	3430	3430
R ²	0.03	0.054	0.024	0.071	0.074	0.03	0.009	0.024

~ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Source: uAspire administrative records

Notes: Coefficients presented from linear probability models predicting values of baseline covariates with indicators for randomized treatment assignment and fixed effects for advisor groups.

Table 4. P-values from omnibus tests of baseline covariate equivalence

	Student only treatment vs. control	Student & parent treatment vs. control	Student only treatment vs. student & parent treatment
Overall	0.388	0.336	0.115
EFC of zero	0.385	0.880	0.786
First generation	0.060	0.849	0.277

Source: uAspire administrative records

Notes: Cells report p-values based on Hansen and Bowers' (2008) omnibus test for assessing baseline equivalence.

Table 5. Intervention take up

	Student received texts	Parent received texts	Student opt out	Parent opt out	Student replied at least once	Parent replied at least once	N texts from student	N texts from parent
Student only	0.999*** (0.001)	-- --	0.022*** (0.004)	-- --	0.364*** (0.012)	-- --	1.936*** (0.108)	-- --
Student & parent	0.978*** (0.004)	0.503*** (0.013)	0.015*** (0.003)	0.012*** (0.003)	0.314*** (0.013)	0.175*** (0.010)	1.800*** (0.140)	1.008*** (0.106)
N	4754	4754	4754	4754	4754	4754	4754	4754
R ²	0.972	0.431	0.013	0.017	0.166	0.138	0.069	0.053

~ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Source: uAspire administrative records

Notes: Coefficients presented from linear probability models predicting measures of intervention participation from randomized treatment assignment and fixed effects for advisor groups.

Table 6. Impact of text based outreach, overall and by target audience

	Overall enrollment	Enrollment, 2-year institution	Enrollment, 4-year institution
<i>Impacts of outreach, overall</i>			
Any outreach	0.031* (0.014)	0.014 (0.012)	0.017 (0.014)
Covariate controls & advisor fixed effects	✓	✓	✓
N	4754	4754	4754
R ²	0.141	0.125	0.235
<i>Impact of outreach, by target audience</i>			
Student only	0.029~ (0.015)	0.021 (0.014)	0.009 (0.015)
Student & parent	0.032~ (0.017)	0.004 (0.016)	0.028~ (0.017)
Control group enrollment rate	0.649	0.213	0.435
Covariate controls & advisor fixed effects	✓	✓	✓
N	4754	4754	4754
R ²	0.141	0.125	0.235
F-test	0.033	1.189	1.32
(p-value)	0.857	0.276	0.251

~ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Source: uAspire administrative records and National Student Clearinghouse

Notes: Coefficients presented from linear probability models predicting enrollment outcomes from randomized treatment assignment, fixed effects for advisor groups, and baseline covariates. Baseline covariates include gender, race / ethnicity, first generation status, FAFSA filing status, EFC of zero, high school GPA, mother's education level, and indicators for missing baseline information.

Table 7. Impact of text based outreach by EFC status, overall and by target audience

	EFC of zero			Non-zero EFC		
	Overall enrollment	Enrollment, 2-year institution	Enrollment, 4-year institution	Overall enrollment	Enrollment, 2-year institution	Enrollment, 4-year institution
<i>Impacts of outreach, overall</i>						
Any outreach	0.057** (0.022)	0.051* (0.020)	0.005 (0.022)	0.012 (0.025)	0.011 (0.024)	0 (0.029)
Covariate controls & advisor fixed effects	✓	✓	✓	✓	✓	✓
N	2010	2010	2010	1182	1182	1182
R ²	0.069	0.144	0.208	0.066	0.138	0.151
<i>Impact of outreach, by target audience</i>						
Student only	0.064** (0.024)	0.051* (0.022)	0.013 (0.024)	0.011 (0.028)	0.038 (0.027)	-0.026 (0.033)
Student & parent	0.047~ (0.026)	0.051* (0.025)	-0.005 (0.026)	0.012 (0.030)	-0.028 (0.029)	0.039 (0.035)
Control group enrollment rate	0.664	0.243	0.421	0.800	0.193	0.607
Covariate controls & advisor fixed effects	✓	✓	✓	✓	✓	✓
N	2010	2010	2010	1182	1182	1182
R ²	0.07	0.144	0.208	0.066	0.142	0.154
F-test (p-value)	0.412	0.001	0.535	0.000	4.906	3.525
	0.521	0.982	0.465	0.996	0.027	0.061

~ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Source: uAspire administrative records and National Student Clearinghouse

Notes: Coefficients presented from linear probability models predicting enrollment outcomes from randomized treatment assignment, fixed effects for advisor groups, and baseline covariates. Baseline covariates include gender, race / ethnicity, first generation status, FAFSA filing status, EFC of zero, high school GPA, mother's education level, and indicators for missing baseline information.

Table 8. Impact of text based outreach by first-generation status, overall and by target audience

	First-generation students			Non first-generation students		
	Overall enrollment	Enrollment, 2-year institution	Enrollment, 4-year institution	Overall enrollment	Enrollment, 2-year institution	Enrollment, 4-year institution
<i>Impacts of outreach, overall</i>						
Any outreach	0.045~ (0.026)	-0.003 (0.023)	0.048~ (0.025)	0.01 (0.025)	0.012 (0.021)	-0.002 (0.026)
Covariate controls & advisor fixed effects	✓	✓	✓	✓	✓	✓
N	1448	1448	1448	1482	1482	1482
R ²	0.139	0.133	0.232	0.145	0.12	0.208
<i>Impact of outreach, by target audience</i>						
Student only	0.067* (0.029)	0.006 (0.025)	0.062* (0.029)	0.01 (0.028)	0.007 (0.023)	0.003 (0.029)
Student & parent	0.016 (0.032)	-0.015 (0.028)	0.03 (0.030)	0.011 (0.029)	0.019 (0.028)	-0.009 (0.031)
Control group enrollment rate	0.638	0.208	0.429	0.691	0.183	0.508
Covariate controls & advisor fixed effects	✓	✓	✓	✓	✓	✓
N	1448	1448	1448	1482	1482	1482
R ²	0.141	0.134	0.233	0.145	0.12	0.208
F-test (p-value)	3.013 0.083	0.628 0.428	1.143 0.285	0.001 0.975	0.215 0.643	0.152 0.696

~ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Source: uAspire administrative records and National Student Clearinghouse

Notes: Coefficients presented from linear probability models predicting enrollment outcomes from randomized treatment assignment, fixed effects for advisor groups, and baseline covariates. Baseline covariates include gender, race / ethnicity, first generation status, FAFSA filing status, EFC of zero, high school GPA, mother’s education level, and indicators for missing baseline information.