



# Subtracting for Success

A Review of Nudges to Improve Educational Outcomes in the United States

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April 2025

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## Acknowledgments

We are grateful to Dan Rosica and Nikolas Silva for providing research assistance for this paper. We would also like to thank Toti Rodriguez Garcia for translating the article into Spanish.

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# Abstract

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**W**e review nearly two decades of evidence on behavioral science interventions designed to improve educational outcomes in the United States and offer a conceptual framework to explain the considerable heterogeneity in intervention efficacy. In line with the concept of additivity bias presented by Adams, Converse, Hales, and Klotz (2021), we find that many behavioral science interventions in education add, rather than subtract, the tasks students and their families have to complete *and* require significant cognitive investment from students and families to complete. Consistent with an extensive behavioral economics literature demonstrating that reducing friction, complexity, and uncertainty can yield substantial benefits across policy domains, we find that interventions that reduce the cognitive load imposed on students and their families tend to be most effective, even if they are additive in terms of solution elements. We offer several recommendations to guide the application of behavioral insights to improve student outcomes.

# Introduction

**E**ducational choices in the United States are both complex and consequential. From when parents are selecting early childhood programs to when students are choosing which college or university to attend, families face an expanding array of options that can significantly shape life outcomes. At the same time that the complexity of educational decision-making has intensified, behavioral science interventions—approaches that help people make choices that better align with and follow through on their own goals—have proliferated throughout the U.S. education system. While some of these interventions have led to tangible improvements in educational outcomes, their effectiveness has also varied substantially. Understanding which approaches work, for whom, and under what conditions has therefore become increasingly important.

**Many aspects of the U.S. education system<sup>i</sup> make it well-suited for behavioral science interventions.** Starting before formal schooling and continuing through postsecondary education, families and students encounter a complex array of educational choices. These schooling options often differ along cost, quality, proximity, and alignment with family/student preferences. For instance, while the quality of early childcare options varies in many communities, families may weigh preferences related to travel time from home or hours of operation more heavily in their decisions than program quality, and may not be aware of or understand variation in childcare center quality or safety. At the other end of the educational spectrum, students and their families must choose among thousands of colleges and universities in the United States to identify programs that best align with their interests, provide sufficient financial assistance, offer a meaningful return on investment, and maintain a campus climate in which students feel a sense of belonging. Even at the primary and secondary level, where school enrollment has traditionally been based on geographic residence, many large school districts now offer district-wide school choice programs, allowing families to apply to any school within the district. These schools often vary substantially in academic quality, student body composition, and other factors important to families.

Many of these choices are discrete and highly consequential. A large body of research demonstrates long-run effects of attending higher-quality educational institutions. Better pre-kindergarten (pre-K) programs enhance cognitive and social skills, providing a strong foundation for future learning. Higher-quality kindergarten through twelfth grade (K–12) schools lead to improved academic achievement and higher graduation rates. Attending better

- Better pre-kindergarten (pre-K) programs **enhance cognitive and social skills**, providing a strong foundation for future learning.
- Higher-quality kindergarten through twelfth grade (K–12) schools **lead to improved academic achievement and higher graduation rates**.
- Attending better colleges is linked to **increased earnings and broader career opportunities**.

<sup>i</sup> For those not familiar with the U.S. education system, we offer a brief summary of the main levels below:

1. **Preschool:** Optional and aimed at children aged 3 to 5, focusing on social and emotional development.
2. **Elementary School:** Covers kindergarten through fifth grade (approximately ages 6 to 11). It focuses on fundamental skills like reading, writing, and math.
3. **Middle/Junior High School:** Encompasses grades 6 to 8 (ages 11 to 14). Students begin to study a wider range of subjects.
4. **High School:** Includes grades 9 to 12 (ages 14 to 18). Students complete required courses and can choose electives. Upon graduation, they receive a high school diploma.
5. **Higher/Postsecondary Education:** Comprises universities and colleges. Students can earn associate degrees (2 years), bachelor's degrees (4 years), and graduate degrees (master's and doctorates).

colleges is linked to increased earnings and broader career opportunities. These are just a few of the many positive associations documented between the quality of higher education and improved life outcomes, all of which underscore the importance of helping people make optimal educational choices. Yet unlike other more routine or habitual decisions (e.g., about study habits), students from the primary to the tertiary level infrequently revisit their choice of school once enrolled.

**Behavioral science interventions—or “nudges”** in popular shorthand—that support families and students to either follow through on their intentions to attend higher-quality schools or make active and informed decisions about their options thus **have the potential to generate substantial benefits**. Such interventions may be particularly important and beneficial for families and students from historically marginalized backgrounds, given both persistent inequality in the U.S. educational and economic system and marginalized families’ comparative lack of access to professional guidance or social capital for navigating these decisions.<sup>1, 2, 3</sup>

From a research perspective, there are several advantages to investigating the impact of nudges in the U.S. education system. Schools in the United States tend to share many consistent structural elements, such as staffing approaches, classroom organization, and grade-level subject matter. This means that, relative to other large industries like healthcare or financial services, successful interventions in one educational context can be replicated and tested in a broad range of additional settings with relatively modest customization. Administrative data is also available for most public school systems in the United States, making it feasible to rigorously evaluate potential impacts of behavioral science interventions. Consequently, many behaviorally informed policies and interventions have been implemented within the U.S. educational system over the past 10–15 years, targeting children as young as 2–3 to working adults considering a return to schooling. These applications have varied substantially in their efficacy. In this review, we attempt to synthesize the many nudges implemented in the U.S. education system and offer a coherent framework to explain why some have been effective while others have not.

## Interventions considered in our review

Over the nearly two decades since Richard Thaler and Cass Sunstein published *Nudge*, the term has expanded to cover an extensive set of behavior-change tactics deployed across a wide range of fields. In reviewing nudges implemented in a U.S. education context, we invoke their original definition, limiting our focus to interventions that change student behavior by modifying their decision-making context, without meaningfully restricting available choices or exerting coercive influence through large incentives or penalties.<sup>4</sup>

In the context of a concise review, we further restrict the sample of nudges we review to those that apply insights from three broad, at times overlapping, research foundations in behavioral science, all of which explore circumstances in which our behavior can fail to align with our own long-term self interest.



**Bounded awareness** refers to insights related to our attention and memory, founded on research exploring contexts in which we overlook, forget, or avoid information or tasks, even when they are critically important and right in front of us.<sup>5</sup> Often these instances of limited or selective attention and memory arise in situations when we are mentally depleted,

distracted, or in a state of heightened anxiety.<sup>6,7</sup> In educational settings, bounded awareness can lead students to forget deadlines, miss opportunities, or neglect tasks that can impact their academic or career outcomes. Common nudge approaches to address these behavioral barriers include streamlining communications so that required actions are harder to overlook or sending automated reminders that prompt students to complete tasks that they may forget about when the time to act comes.



**Bounded rationality** *refers to insights related to our judgment and decision-making*, drawing on research exploring limitations in the ways we construe options, weigh costs and benefits, and determine our choices, as well as the contextual features that can influence those processes.<sup>8,9,10</sup> In contrast to traditional economic assumptions, bounded rationality acknowledges the heuristics and mental shortcuts we often use to make choices, as well as the cognitive biases and framing effects that can sway our decisions. In educational settings, bounded rationality can help explain how students evaluate the complex choices of schools, majors, or careers. Common nudge approaches that leverage these insights include decision aids that isolate and compare key criteria related to important choices, such as which school to attend; or changes to defaults, such as preselected options in loan offers, that communicate a recommendation and combat the effects of status quo bias.



**Bounded self-control** *refers to insights related to our regulation of our behavior*, with a particular focus on contexts in which our actions fall out of line with our goals.<sup>11</sup> Of key importance here is present bias, which can lead to time-inconsistent preferences that manifest in us changing our minds, giving up, or procrastinating when the time to follow through on goal-oriented behavior arrives.<sup>12</sup> When navigating processes with a high degree of complexity or administrative burden, the time, money, or cognitive costs of seemingly small hassles can cause us to give up, even when the potential benefits of pushing through are large.<sup>13,14</sup> Despite acknowledging the benefits of enrolling in a degree program or applying for a scholarship, students may let the hassles involved with an application process put them off; and despite understanding the importance of completing assignments on time and studying, students nevertheless have a tendency to procrastinate. Common nudge approaches that address these barriers include streamlined or autopopulated applications to help reduce the hassles involved in financial aid or admissions processes.

In focusing our review on interventions that leverage insights from the above categories, we acknowledge that there are many other nudge approaches that draw on social psychology and other related fields to improve student decision-making and behavior. We encourage interested readers to consider reviews that discuss these interventions in greater detail.<sup>15,16,17</sup>

Finally, we note that in selecting interventions to consider in this review, our aim is not to be exhaustive. We focus on interventions that have been evaluated through rigorous experimental methods—generally randomized controlled trials (RCTs)—and which collectively offer a broadly representative overview of nudges in the U.S. education system. For a more comprehensive survey of the many approaches that have been implemented over the years, we encourage readers to consider more thorough reviews.<sup>18,19</sup>



# Two dimensions to categorize nudges

In this review we categorize nudges on the basis of whether they “add” or “subtract” elements from student-facing processes, programs, or interfaces. Borrowing the framework introduced by Adams, Converse, Hales, and Klotz (2021), we examine the extent to which the nudges we review either:

- + Add:** Require students to complete more tasks, interact with new products and services, or otherwise “check more boxes” on the path to their educational goals; or
- Subtract:** Reduce the number of tasks students have to complete, eliminate products and services, or otherwise simplify processes.

Beyond looking at elements in the solution space, we extend this type of “add/subtract” framework along an additional dimension related to the “cognitive bandwidth” that the solutions require. Drawing on the work of Mullainathan and Shafir (2013), we also examine the extent to which the nudges we review:

- ↑ Increase:** Require greater mental capacity and cognitive resources to focus attention, process information, make decisions, and regulate behavior; or
- ↓ Reduce:** Require less mental capacity and cognitive resources to focus attention, process information, make decisions, and regulate behavior.

These two dimensions often correlate—nudges that add elements tend to increase cognitive load, and vice versa—but there are cases where the pattern is flipped. For example, sending a decision aid comparing net cost and quality of local schools to the families of high school-bound students, while adding a new element to the enrollment process, can reduce the complexity of selecting the right school.

This two-dimensional conceptualization of adding vs. subtracting and increasing vs. reducing allows us to categorize nudges into the following four quadrants represented below.

<b>ADD-REDUCE</b> <b>+ / ↓</b> <b>Adds</b> elements in a way that <b>reduces</b> the cognitive load. → Ex: Sending families a table comparing quality of local K-12 schools.	<b>ADD-INCREASE</b> <b>+ / ↑</b> <b>Adds</b> elements in a way that <b>increases</b> the cognitive load. → Ex: Texting students generic informational reminders about course registration.
<b>SUBTRACT-REDUCE</b> <b>– / ↓</b> <b>Subtracts</b> elements in a way that <b>reduces</b> the cognitive load. → Ex: Auto-populating financial aid applications using tax filings.	<b>SUBTRACT-INCREASE</b> <b>– / ↑</b> <b>Subtracts</b> elements in a way that <b>increases</b> the cognitive load. → Ex: Eliminating mandatory advisor meetings to register for courses.

In the following sections, we describe the overarching insights from studies in the categories above, then provide details on the interventions and results involved in those studies in summary tables. We omit the “subtract-increase” because we found so few examples of interventions that subtracted elements from a solution while increasing the cognitive effort required of students or their families.



## ADD-REDUCE



We begin our review with the set of studies that evaluate “Add-Reduce” interventions: those which engage students or families in **additional** activities to advance academic success, but are structured in a way to **reduce** the cognitive load required to progress academically. We organize our review by the level of education at which the focal intervention of each study is applied: prekindergarten (pre-K) to end of secondary schooling; secondary to university education transition; and university education.

### *Pre-K to the end of secondary schooling*

Most of the behavioral research at the primary and secondary levels in the United States has focused on parents as the level of intervention. Among children who are too young for formal schooling, these interventions are motivated by the substantial differences in home learning environments between lower- and higher-income families, and the potential of parent-facing interventions to strengthen the learning activities and support within lower-income households.<sup>20</sup> Behavioral interventions for younger children aim to overcome resource constraints that families may face in engaging their children in learning, while also reducing the cognitive load involved with figuring out *how* to effectively promote learning and regularly set aside time to do so. One study for instance,<sup>21</sup> leveraged text

Effective behavioral interventions for younger children aim to **overcome resource constraints that families may face** in engaging their children in learning, **while also reducing the cognitive load** involved with figuring out *how* to effectively promote learning and regularly set aside time to do so.

messaging to provide parents of pre-K children with a sequence of concrete, small activities they could use to promote early literacy development. The authors designed the texts to be easily integrated into families’ daily home activities, like taking a bath or having a meal. For instance, one text read: “Point out the first letter in your child’s name in magazines, at the store & on signs. Have your child try. Make it a game. Who can find the most?” The authors delivered three such texts a week over the course of eight months. By the end of the intervention, treated children scored 0.11 standard deviations (SD) higher on an early literacy assessment. A related study used tablets preloaded with age-appropriate texts and equipped with behavioral tools that prompted parents to read regularly with their children. After six weeks, the authors found that **the amount of time parents spend reading with their children more than doubled among treated families.**<sup>22</sup> These interventions thus **added** early literacy activities for parents to engage with in their children while **subtracting** the cognitive demands on parents to figure out how and when to promote their child’s reading development.

Among school-age children, some behavioral interventions are motivated by asymmetries in information between parents and students, with students strategically selecting what information to disclose to parents about school attendance and assignment completion/performance, and parents facing nontrivial costs to acquire more complete information on their child’s schooling.<sup>23</sup> In one study, researchers partnered with middle and high schools to integrate automated text messaging to parents into the district student information system. The text messages provided parents with regular information about their child’s absences, assignment completion, and assignment performance.<sup>24</sup> The authors found that **students in treated families had higher rates of attendance (12%), reduced course failures (30%), and, among high school students, an average grade point average (GPA) increase of 0.12.** Similar approaches have been used in middle school settings to increase attendance

and assignment completion<sup>25</sup> and in a summer school recovery setting to increase the share of students that earned high school credit.<sup>26</sup> As with the pre-K interventions, these approaches **added** activities for parents to undertake, in the form of engaging with their child around their school participation and coursework, but **reduced** the cognitive load required to figure out whether their child is in school and how they are doing in their courses.

### **Secondary to university education transition**

Students in the United States face complex processes both applying to college and securing financial assistance to pay for a university education. The college application process requires students and families to choose which of the thousands of colleges and universities in the country optimally balance students' preferences (e.g., academic program and rigor, proximity to home) and financial resources. Barr and Castleman (2021) showed that even among institutions with similar attributes (e.g., institutional graduation rate), costs vary substantially, which exacerbates the complexity of the search process. For lower-income families, paying for college requires students and families to complete several complex tasks: completing financial aid applications (in some cases, one application for federal and state aid and a different application for institutional aid), applying for supplemental private scholarships, and often submitting supplementary student loan applications.

Even when interventions require time from students—like one-on-one college advising—**simplifying the decision process around college access and financial aid can boost both college enrollment and graduation rates**, particularly for low-income students.

Given these complexities, there are numerous efforts at the local, state, and federal level to support students (particularly those from lower-income backgrounds) to successfully transition from secondary to university education. One set of interventions leverages college advisors and peer mentors to offer students direct assistance with college and financial aid application processes. For instance, Barr and Castleman (2021) evaluated the Bottom Line college advising program, which provides students from low-income families in several U.S. cities with individualized college advising throughout students' final year in secondary school. Advisors work with students to search for colleges and universities that align with their academic performance and preferences. They then work with students to complete applications to these institutions. Advisors also help students apply for public and private sources of financial assistance to pay for higher education. They then work with students to choose a college or university from their accepted choice set that optimally matches the student's goals and circumstances. Students spend an average of 10–15 hours with their advisor on these processes. The authors found that **treated students both enrolled in higher education at higher rates (6%) and were substantially more likely (18%) to earn a bachelor's degree within six years of high school.** Other studies of similarly designed college advising and mentoring interventions find similarly positive and large impacts on postsecondary educational outcomes.<sup>27,28,29</sup> While these interventions necessitate students to **add** substantial time and effort to higher education preparation, they greatly **subtract** the cognitive load needed to figure out which institutions to apply to; to obtain financial aid to pay for postsecondary education; and to choose which institution in a student's accepted choice set optimally balances students' preferences and financial constraints.

Another approach has been to use text messaging both to provide students with personalized information about college and financial aid tasks they need to complete, and to connect students to college or financial aid advisors who can provide individualized support and assistance. For instance, Castleman and Page (2015; 2017) evaluated texting campaigns that provided recent secondary school graduates with personalized information about prematriculation tasks they were required to complete at the college or university where they intended to enroll. The texts also encouraged students to respond and connect with a college or financial aid advisor to ask questions or discuss any challenges that had arisen since graduation. These campaigns were implemented in partnership with community-based organizations or secondary schools. The authors found that **students randomly assigned to receive the text messages were 3.1 percentage points more likely to immediately enroll in college or university**. Similar campaigns focused on supporting students with prematriculation tasks<sup>30</sup> or to apply for federal financial assistance for postsecondary education<sup>31</sup> have also led to sizable increases in college/university enrollment. As with the more intensive college advising interventions, these interactive text campaigns required students to invest additional time to engage with advisors and complete important tasks related to pursuing or continuing in postsecondary education, but in doing so, they **reduced** the cognitive load that students and families would have to invest to complete these tasks independently.

### University education

















Students who successfully navigate the transition to higher education continue to face complex choices and processes as they advance toward a degree. For instance, students have to select a program of study that aligns with their academic abilities and interests, and each term, they have to choose which courses to take to efficiently complete their degree. Students also have to reapply for financial aid on an annual basis. Numerous interventions have employed coaching models to help students navigate this complexity. Consistent with the findings of college advising and mentoring interventions for secondary students, Bettinger and Baker (2014) showed that **intensive coaching for current college and university students can improve academic performance and degree attainment**. Castleman and Page (2016) demonstrated that **interactive text message guidance and support can generate large increases in financial aid renewal and postsecondary educational persistence among community college students**. Oreopoulos and Petronijevic (2019) demonstrated that students respond to ongoing coaching by increasing the amount of time they spend studying each week (the focal behavior of this particular coaching intervention), though this increase in study time did not result in improved academic performance. As with the prior coaching interventions we discussed, these approaches **add** time and effort for students to discuss dimensions of their university experience but **reduce** cognitive effort associated with figuring out how to be academically successful in postsecondary education, at least in the case of the Bettinger and Baker (2014) study.






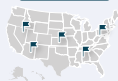


**Higher-touch coaching and mentoring has shown promising effects** for college and university students facing complex choices and processes as they advance towards a degree.

# ADD-REDUCE



	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
PreK-12	<b>Bergman &amp; Chan (2021):</b> <b>Weekly parent achievement alerts:</b> Weekly, automated alerts sent to parents about their child's academic achievement.	 ACADEMIC PERFORMANCE	<ul style="list-style-type: none"> <li>↓ 28% decrease in course failures</li> <li>↑ 12% increase in class attendance</li> <li>↓ 1.5 percentage points decrease in student drop-outs (50% decrease)</li> <li>— no impact on state test scores</li> </ul>	MUNICIPAL 	22 middle and high schools in Kanawha County Schools (KCS), West Virginia
	<b>Clark et al. (2020):</b> <b>Goal-setting and reminders:</b> Students set goals at the start of a course, which were then referenced in later reminder messages.	 ACADEMIC PERFORMANCE	<ul style="list-style-type: none"> <li>↑ 0.1 SD increase in number of practice exams completed and course grades for task-based goals</li> <li>— no impact on performance-based goals</li> </ul>	LOCAL 	Two unnamed universities
	<b>Kraft &amp; Rodgers (2015):</b> <b>Summer school teacher-parent outreach:</b> Individualized messages sent from teachers to parents with information about their child's performance and behavior.	 COLLEGE PERSISTENCE & COMPLETION	<ul style="list-style-type: none"> <li>↓ 41% reduction (16% to 9%) in failing to earn course credit</li> </ul>	LOCAL 	Director and Coordinators of high school credit recovery program in large urban school district in the Northeastern United States
	<b>Mayer et al. (2019):</b> <b>Tablet-based early literacy engagement campaign:</b> Tablets provided to parents designed to promote parental engagement in early literacy and behavioral tools to prompt reading with kids.	 EARLY LITERACY	<ul style="list-style-type: none"> <li>↑ Doubled the amount of time parents spent reading using the electronic application (one SD effect size)</li> </ul>	LOCAL 	READY4K! child literacy nonprofit, San Francisco Unified School District
	<b>York et al. (2019):</b> <b>Pre-literacy texting campaign:</b> Text messages providing parents with effective pre-literacy strategies to practice with their children.	 EARLY LITERACY	<ul style="list-style-type: none"> <li>↑ Increased parental involvement at home and school by 0.15 to 0.29 SDs, leading to child gains in early literacy of about 0.11 SDs</li> </ul>	LOCAL 	California Preschool Learning Foundations
College Access	<b>Avery (2013):</b> <b>Intensive college advising:</b> Two-year after-school advising program for high school juniors and seniors, covering SAT and ACT preparation, college admissions and financial aid consulting.	 COLLEGE ENROLLMENT	<ul style="list-style-type: none"> <li>↑ 15 percentage points increase in college enrollment</li> </ul>	LOCAL 	College Possible, a nonprofit in the Minneapolis St. Paul region

Authors (Year) / Description		Primary Outcome	Estimated Effect	Scale	Partner(s)
College Access	<b>Barr &amp; Castleman (2021): Intensive college advising:</b> Advisors provide regular, in-person coaching to high school students from late junior year through senior year, offering comprehensive college and financial aid guidance, including application assistance and scholarship searches.	 COLLEGE PERSISTENCE & COMPLETION	 Increased bachelor's degree attainment by 7.6 percentage points within 5 years of high school; 9.6 percentage points within 6 years	<b>MULTI-SITE</b> 	Bottom Line, a nonprofit college advising program focusing on first-generation students
	<b>Carrell &amp; Sacerdote (2017): College application mentorship:</b> Guidance from current college students to help high school students complete the college application process, including providing mentoring, paying small fees, and offering a stipend.	 COLLEGE ENROLLMENT	 Overall, 6 percentage points increase in college-going for the mentoring treatment; for women, 14.6 percentage points increase in the college-going rate	<b>LOCAL</b> 	New Hampshire high schools
	<b>Castleman, Deutschlander, &amp; Lohner (2024): Intensive college advising:</b> Students paired with coaches for regular personalized in-person advising on college preparation, including exam preparation, college selection, financial aid, and the transition to college, starting in their junior year and continuing through their college experience.	 COLLEGE PERSISTENCE & COMPLETION	 Increased bachelor's degree attainment by 6.5 percentage points within 5 years of high school	<b>MUNICIPAL</b> 	College Forward (now College Possible Texas), collaboration with high schools in Austin and Houston-area
	<b>Castleman &amp; Page (2015): Summer melt outreach campaign:</b> Text messages and peer mentor outreach focused on preventing summer melt.	 COLLEGE ENROLLMENT	 7 percentage points overall increase in text messaging arm for students in Lawrence and Springfield (MA), no impact in Boston (students had high access to counseling); 4.5 percentage points increase in enrollment for peer mentorship arm at four-year college enrollment	<b>STATEWIDE</b> 	Dallas Independent School District; uAspire, a Boston-based nonprofit organization focused on college affordability; and Mastery Charter Schools in Philadelphia, PA
	<b>Page, Castleman, &amp; Meyer (2020): FAFSA submission texting campaign:</b> Text messages delivering personalized info on FAFSA application status and providing application assistance.	 FINANCIAL AID APPLICATION	 6 percentage points increase in FAFSA submission  3 percentage points increase in timely college enrollment	<b>REGIONAL</b> 	Texas Higher Education Coordinating Board, SignalVine text messaging platform

	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
College Access	<b>Page &amp; Gehlbach (2017): Enrollment chatbot:</b> Chatbot sent personalized messages to students during spring/summer to assist with enrollment process.	 COLLEGE ENROLLMENT	↑ Increased on-time enrollment by 3.3 percentage points	<b>LOCAL</b> 	Georgia State University and AdmitHub
	<b>Bettinger &amp; Baker (2014): Intensive college advising:</b> Coaches guide students in developing success strategies through regular phone, email, text, and social media outreach and use predictive algorithms to tailor support and encouragement.	 COLLEGE PERSISTENCE & COMPLETION	↑ 5.2 percentage points increase on retention after 6 months (9% relative increase) ↑ 5.3 percentage points increase on retention after 12 months (12% relative increase) ↑ 4.3 percentage points increase on retention after 18 months (15% relative increase) ↑ 3.4 percentage points increase on retention after 24 months (14% relative increase)	<b>NATIONAL</b> 	InsideTrack, a student coaching service
College Success	<b>Castleman &amp; Page (2016): FAFSA renewal texting campaign:</b> Texting messages focused on prompting students to resubmit the FAFSA.	 FINANCIAL AID APPLICATION	↑ 14 percentage points increase in FAFSA renewal rates for community college students — no impact for four-year institutions, no impact on college persistence	<b>MULTI-SITE</b> 	uAspire, a Boston-based nonprofit organization focused on college affordability
	<b>Oreopoulos &amp; Petronijevic (2018): Peer coaching and texting campaign:</b> Coaching provided by upper-year students who monitored progress, advised on challenges, and a texting campaign providing academic advice, information, and motivation.	 ACADEMIC PERFORMANCE	↑ 0.3 SD increase in average grades and 0.35 SD increase in GPA for coaching, no effect for text messaging campaign	<b>LARGE PSE INSTITUTION</b> 	University of Toronto



## **ADD-INCREASE**



We continue our review with the set of studies that evaluate “Add-Increase” interventions: those which engage students or families in **additional** activities to advance academic success, but which require students or families to independently invest **increased** cognitive load to progress academically. The vast majority of the studies we identified in the “Add-Increase” category focused on the secondary to university education transition or on university education, so we focus our review there.<sup>ii</sup>

### ***Secondary to university education transition***

Building on the promising evidence from the advising and interactive text campaign interventions described above, numerous studies over the past several years have investigated efforts to scale nudge and advising interventions to support more students. One approach has been to use remote technologies (e.g., videoconferencing, document collaboration) to remotely connect students to college advising. These interventions are designed to provide similar “on-demand,” individualized support to students as the intensive college advising models described above, while relaxing the constraint that students and advisors would have to both be in the same community and able to engage in-person. For instance, Gurantz et al. (2020) evaluated a remote advising program operated by a national nonprofit, the College Advising Corps, in which high-achieving, lower-income students across the United States were offered individualized remote advising assistance with the college/university and financial aid application process. One notable finding from this study was that **students randomly assigned to remote advising took up the offer at much lower rates than students randomly assigned to in-person, intensive advising** (44% vs. 97% in the Bottom Line study described above). Correspondingly, the authors reported much smaller impacts on postsecondary enrollment: no effect on overall enrollment or on university enrollment, and a fairly modest (2.6 percentage point) increase in enrollment at selective colleges and universities (for which the target population was a good academic match). Similar results, both in terms of lower take-up and small or no impact on enrollment, have been found in other experimental evaluations of remote advising interventions.<sup>32,33</sup> These studies suggest the *medium* of engagement might be an important factor in the efficacy of interventions designed to provide students and families with support as they navigate complex educational processes and decisions. While remote advising interventions are designed to provide the same access to “on-demand” support, students take up the opportunity at much lower and less intensive rates. As a result, they and their families still have to exert substantial cognitive effort to choose which colleges and universities to apply to; to complete applications; to secure financial assistance; and ultimately to decide where to enroll.

Remote advising tends to be less effective than in-person support, largely because **lower student engagement limits its ability to ease the cognitive burden** of college decision-making.

<sup>ii</sup> We did identify one pre-K study in the Add-Increase category: Weixler et al. (2020) evaluated a texting campaign encouraging applicants to publicly funded preschool to verify their program eligibility, and found that weekly reminders led to a substantial increase in verification rates. While parents still had to take action to complete the verification process after receiving the reminder, verification itself required relatively little cognitive load. As we discuss in the remainder of this section, Add-Increase interventions can still be effective when the additional cognitive load students or families are required to independently invest is relatively modest.



Another approach has been to scale text messaging interventions to both state and national levels. As these campaigns have scaled, several important design features have changed relative to the community-based text campaigns described earlier: some large-scale campaigns have shifted to one-way and more uniform messaging, in contrast to the interactive and personalized content of earlier campaigns. Those that continue to offer **interactive texting and text-based advising rely on centralized advising providers with whom students did not have a prior connection, and given the scale of the campaigns, often had much larger student caseloads per advisor.** For instance, Bird et al. (2021) evaluated two large-scale text campaigns, one with a national nonprofit in the United States and one with a large state agency, focused on supporting students in obtaining or renewing financial assistance to pay for college. The combined experimental sample for the interventions exceeded 800,000 students in the United States. In contrast with Page, Castleman, and Meyer (2020), which provided personalized updates on the status of students' financial aid applications and opportunities to connect with financial aid advisors via text, the text content in Bird et al. (2021) was uniform, more generic, and primarily informational (one small treatment arm was offered the opportunity to respond to texts and engage with an advisor). The authors reported precisely estimated null impacts of the large-scale text campaign on students' postsecondary enrollment or persistence. **Other similarly designed large-scale text campaigns also reported precisely estimated null impacts on postsecondary enrollment, enrollment quality, or persistence,** both among traditional secondary and college/university student populations<sup>34,35</sup> and among nontraditional populations (e.g., military personnel) that would typically lack access to education planning resources.<sup>36</sup> Interestingly, some of the large-scale campaigns that provided interactive advising assistance (e.g., Barr et al. 2025) did induce high rates of participant engagement. Due to large caseloads and a lack of familiarity with students' circumstances and contexts, however, textual analysis conducted by the authors suggest that advisors provided much more limited support.

Similar patterns emerge from interventions that use other channels (e.g., print or digital media; email) to provide students with information designed to encourage a broader postsecondary application portfolio<sup>37</sup> or to inform students and families about federal tax benefits that reduce the cost of pursuing postsecondary education.<sup>38</sup> As with the text-based interventions, these studies find precisely estimated null impacts on postsecondary enrollment or persistence.<sup>iii</sup> Taken collectively, this body of research illustrates that behavioral interventions are unlikely to be effective when the information, encouragement, or assistance they provide are structured or delivered in a way that does not meaningfully reduce the cognitive effort students or families have to independently invest to complete complex tasks or processes.













Large-scale outreach campaigns that deliver **generic or one-way messages over text, email, or other channels fail to improve enrollment** outcomes because they do not reduce the cognitive effort required from students and their families as meaningfully as personalized support.













<sup>iii</sup> One exception to this overall pattern is Hoxby and Turner (2013), which provided high-achieving, low-income students with semicustomized information about colleges and universities that were a good academic match and affordable net of financial aid. This intervention led to substantial improvements in enrollment quality.











## University education













Results from behavioral interventions conducted with current college or university students support similar conclusions: **Interventions that add activities for students to complete but which require little additional cognitive load can lead to improved outcomes, while interventions that add activities without reducing the cognitive load students need to independently invest tend to be ineffective.** For instance, Headlam, Anzelone, and Weiss (2018) evaluated a campaign using email and postal messaging designed to simplify the process by which current students enroll for summer term courses while making salient the benefits of summer credit accumulation. The authors reported moderate increases in both summer enrollment and overall credit attainment. Treated students still had to independently enroll for the summer term, but the actual process of summer enrollment was essentially identical to course registration processes students were accustomed to completing during the academic year, and so required little additional cognitive effort. By comparison, Darolia and Harper (2018) evaluated the impact of a university sending current students a personalized letter informing how much they had borrowed in student loans; projected future monthly payments to repay their loan; and the average amount borrowed by peers. The authors reported null impacts on both borrowing and academic outcomes, perhaps because the letter itself was insufficient to reduce the cognitive effort students would need to invest to determine whether a change in their loan borrowing rate was academically and financially more optimal. Bettinger et al. (2022) evaluated an interactive text campaign designed to increase degree attainment rates among students who had earned substantial credits but were at risk of withdrawal prior to completing their program of study. The text campaign was conducted at over twenty broad-access colleges and universities in the United States, and offered students the opportunity to connect with an advisor at the college or university. Treated student engagement with interactive text messaging was quite high at many of the colleges and universities, but as with the large-scale text campaigns described earlier, the intensity and quality of advising support students received was quite limited. The authors reported precisely estimated null impacts on credit accumulation and degree attainment, likely because the intervention did not meaningfully reduce the independent effort students had to invest to earn their degree (e.g., identifying courses in upcoming semesters that fulfill remaining degree requirements; securing financial assistance to pay for remaining terms). **Overall, these results reinforce that interventions that add tasks for students to complete and that expect substantial cognitive investment are less likely to be effective.**

Behavioral interventions succeed in higher education when they simplify next steps without increasing cognitive effort—while **those that expect students to independently navigate complex decisions tend to fail.**

	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
ADD-INCREASE					+ / ↑
PreK-12	<b>Balu et al. (2016):</b> <b>Attendance texting campaign:</b> Sending parents daily absence updates and weekly attendance summaries via text messages.	 ACADEMIC PERFORMANCE	— No impact	 MUNICIPAL	New Visions for Public Schools, which supports a network of district-run high schools in New York City
	<b>Bergman, Lasky-Fink, &amp; Rogers (2018):</b> <b>Parent academic performance texting campaign:</b> Providing parents regular information about students' academic progress through text messages, and for some families home visits focused on skills-based information.	 ACADEMIC PERFORMANCE	↑ Info condition increased GPA by 0.13 SDs; Info + Skills intervention increased math scores by 0.13 SDs (no impact for Info only); Info and Info + Skills interventions reduced attrition by 4 percentage points	 LOCAL	Middle and high schools; Believe2Become, a local initiative to promote preK-12 student success; Groundwork Community Consulting
	<b>Kraft &amp; Nussbaum (2017):</b> <b>Summer learning loss texting campaign:</b> Text-messaging program that encouraged parents to promote literacy through specific reading activities and resources during the summer for students in grades 1-4.	 EARLY LITERACY	↑ 0.15 SD increase in reading literacy, 0.21-0.29 SD increase in reading comprehension for 3 <sup>rd</sup> and 4 <sup>th</sup> graders (no effect for 1 <sup>st</sup> and 2 <sup>nd</sup> graders)	 LOCAL	Two elementary schools
	<b>Weixler et al., (2020):</b> <b>Preschool application verification texting campaign:</b> Text messages that prompted families applying to pre-school to verify their application information.	 RESOURCE UPTAKE	↑ Text message reminders increased verification rates by 7 percentage points, and personalized messages increased enrollment rates for some groups.	 LOCAL	District administrators for publicly funded early childhood education programs in New Orleans
College Access	<b>Avery et al. (2021):</b> <b>College search and application texting campaign:</b> Text messages focused on college search, applications, and financial aid.	 COLLEGE ENROLLMENT	↑ Null effects in the national version; but, in the school-based intervention, positive and significant impacts on several college-going steps and on college enrollment for certain subgroups	 NATIONAL	National nonprofits for national scale; Texas school districts for school-based version
	<b>Barr et al. (2025):</b> <b>Postsecondary information campaign:</b> Providing personalized information about postsecondary options via post, email, and text, along with remote advising access.	 COLLEGE ENROLLMENT	— No impact	 NATIONAL	U.S. Army, Virginia College Advising Corps

Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
<b>Bergman, Denning, &amp; Manoli (2017): Tax credit information campaign:</b> Email and letters about using tax credits to pay for higher education.	 COLLEGE ENROLLMENT	— No impact	 STATEWIDE	ApplyTexas is an official portal used by all public universities in Texas and many public community colleges
<b>Bird et al. (2021): FAFSA completion/renewal texting campaign:</b> Text messages that focused on completing or renewing the FAFSA, implemented nationally and at the state level.	 FINANCIAL AID APPLICATION	— No impact	 NATIONAL	The Common Application, Unnamed large state
<b>Bursztyn &amp; Jensen (2015): Revealing SAT prep course sign-ups:</b> Making sign-ups for an SAT preparatory course either publicly viewable to a student's peers or private.	 RESOURCE UPTAKE	<p>↓ 11 percentage points decrease in sign ups when public for non-honors students; 15 percentage points decrease in sign ups when public for students taking both honors and non-honors courses when offered in non-honors course</p> <p>↑ 8 percentage points increase in sign ups when public for students taking both honors and non-honors courses when offered in honors course</p>	 MUNICIPAL	The four largest public high schools in a disadvantaged area of south Los Angeles
<b>Castleman &amp; Page (2017): College enrollment texting campaign:</b> Personalized text messages to students and parents about tasks needed to enroll in college.	 COLLEGE ENROLLMENT	↑ 3.1 percentage points increase on college enrollment (4.8% relative change)	 NATIONAL	uAspire, a Boston-based nonprofit organization focused on college affordability
<b>Gurantz et al. (2020): College search outreach campaign:</b> Brochures and emails to encourage students to start their college search, reduce data aggregation costs, and promote a wider range of college applications, with by text reminders and fee waivers for some students.	 COLLEGE ENROLLMENT	— No impact	 NATIONAL	College Board, College Advising Corps, and Bloomberg Philanthropies
<b>Headlam, Anzelone, &amp; Weiss (2018): Summer enrollment information campaign:</b> Email and mail campaign designed to simplify the summer enrollment process for students.	 COLLEGE ENROLLMENT	↑ Increased summer enrollment by 5 percentage points	 LOCAL	Ohio Association of Community Colleges (OACC)

	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
College Access	<b>Oreopoulos &amp; Dunn (2013): Value of college video and aid calculator:</b> Short video about the value of higher education and a financial aid calculator.	 COLLEGE ENROLLMENT	↓ Those unsure about their attainment prior to treatment are 18.5 percentage points less likely to express uncertainty three weeks after treatment; 3.3% fewer report being unsure compared to the control group, while 3.5% more maintain their intention of obtaining a PSE degree	 LOCAL	Toronto public schools
	<b>Phillips &amp; Reber (2022): Virtual college advising:</b> Text and email campaign providing low-income students with information, reminders, and support for applying to college; some students received \$20 gift cards for completing tasks and an offer to meet with an advisor virtually.	 COLLEGE ENROLLMENT	— No impact	 REGIONAL	EdBoost Education, a Los Angeles-based nonprofit
	<b>Sullivan et al. (2021): Virtual college advising:</b> Providing light-touch college advising remotely/virtually for high-achieving low- and moderate-income students	 COLLEGE ENROLLMENT	↑ 1.3 percentage points increase in enrollment at CollegePoint schools ↑ 3.2 percentage points increase in enrollment at CollegePoint schools for COVID cohort — no impact on college persistence (maintaining enrollment)	 NATIONAL	CollegePoint, a nonprofit that works to boost college access among high-achieving, lower-income students
College Success	<b>Barr, Bird, &amp; Castleman (2021): Student loan awareness texting campaign:</b> Text messages that informed students about their borrowing needs, impacts of borrowing choices, and offered to answer questions.	 STUDENT BORROWING	↓ Reduced share of students borrowing at the maximum by 2.73 percentage points; 4.2 percentage points reduction in likelihood of earning course credits ↑ 3 percentage points increase in likelihood to fail a course	 LOCAL	Community College of Baltimore County
	<b>Bettinger et al. (2022): Late withdrawal prevention texting campaign:</b> Texting messages that connected upperclass students to campus resources to prevent late course withdrawal, with fairly high advising response rates.	 COLLEGE PERSISTENCE & COMPLETION	— No impact	 MULTI-SITE	20 broad-access, public colleges and universities across five states

Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
<b>Cabrera &amp; Cid (2017):</b> <b>Relative performance feedback:</b> Providing college students with feedback on their performance relative to their peers.	 ACADEMIC PERFORMANCE	<p>↓ Women academic performance decreased</p> <p>↑ Men report higher satisfaction with their GPA while treated women report less satisfaction</p>	 LARGE PSE INSTITUTION	Three Schools at Universidad de Montevideo: Economics, Engineering, and Law
<b>Darolia &amp; Harper (2018):</b> <b>Personalized loan notices:</b> Sending student borrowers notices with details on their borrowing to date, projected future repayments, and average peer borrowing amounts.	 STUDENT BORROWING	— No impact	 LARGE PSE INSTITUTION	University of Missouri (MU)
<b>Levy &amp; Ramim (2013):</b> <b>Online exam incentivizes:</b> Incentivizing students to take online exams earlier in the week by giving them additional time if they took them sooner in the week.	 ACADEMIC PERFORMANCE	Students completed the online exam 47.5 hours earlier on average	 LOCAL	Undefined academic institution in the southeastern United States
<b>Page et al. (2023):</b> <b>FAFSA renewal campaign with advising offer:</b> Text messages focused on FAFSA renewal, with one treatment arm offering advising.	 FINANCIAL AID APPLICATION	— No impact	 NATIONAL	Signal Vine text messaging platform, RTI (research firm), National Center for Education Statistics (NCES)
<b>Pugatch &amp; Wilson (2018):</b> <b>Peer tutoring promotion:</b> Sending students postcards promoting the availability of free peer tutoring, testing different messaging approaches.	 RESOURCE UPTAKE	↑ Increased attendance overall (across treatments) by 6.7 percentage points	 LOCAL	Reed College Tutoring Center
<b>Schwebel et al. (2008):</b> <b>Intrusive advising reminders:</b> Sending increasingly intrusive email and phone call reminders to students to make advising appointments.	 RESOURCE UPTAKE	<p>↑ Increased advising appointment rates by 12 percentage points</p> <p>↓ Reduced time to advising appointments by approximately 9-10 days</p>	 LOCAL	University of Alabama at Birmingham (Division of General Studies)



## SUBTRACT-REDUCE



We conclude this review with the set of studies that evaluate “Subtract–Reduce” interventions: those that simplify or eliminate activities that students or families need to undertake in a way that also reduces the cognitive load needed to advance academically.<sup>iv</sup> As in the prior sections, we organize our review by the level of education at which the focal intervention of each study is applied.

### *Pre-K to the end of secondary schooling*

The fully subtractive behavioral approaches reviewed in this article focus on school choice as the main decision to be nudged, again with parents as the level of intervention. This focus is motivated by the considerable complexity of comparing and choosing among different schools, as well as evidence that wealthier families tend to place more weight on academics when selecting schools.<sup>39</sup> This creates an opportunity to help improve academic outcomes, particularly for students from lower-income households, by simplifying the complexity of information shared regarding schools to facilitate comparison along key metrics related to school quality. These approaches tend to be doubly subtractive in that they often dramatically simplify the information provided or the process involved in accessing that information, while also reducing cognitive complexity by allowing families to easily compare schools across just a few dimensions.

***Simplifying school choice information for parents—*** especially by eliminating unnecessary information and highlighting a few key quality indicators—***helps families select better schools and improves student outcomes*** at the pre-K to secondary level.

For example, Hastings and Weinstein (2008) took advantage of a natural experiment created by a change in federal law that required a large public school district to send a printout of average test scores for every school in the district to parents along with their school choice form. Before this change was enacted, parents were sent a school choice guide over 100 pages long with nonstandardized descriptions of each school, and comparing academic outcomes across schools required parents to visit the school district’s website and look up schools one by one. The authors found that offering parents this kind of transparent and easily accessible information on school-level academic performance has impact at two stages: First, it **increases the likelihood of a higher-quality school being chosen by 5 to 7 percentage points**, with the average test scores of chosen schools rising 0.05 to 0.10 student-level standard deviations; and second, using an instrumental variables (IV) approach, they found that **choosing a better school has a large, marginally significant impact on students test scores** (0.37–0.41 standard deviation units).

More recently, Cohodes et al. (2022) offered direct experimental evidence on the effects of this subtractive approach to supporting parents when it comes to school choice. They partnered with the New York City Department of Education to test a range of approaches that aimed to simplify information, reduce search costs, and facilitate decision-making for the families of eighth graders about to enter high school. The authors evaluated these approaches through a large school-level RCT, finding them to be effective at reducing the likelihood of a student applying to and enrolling in a high

<sup>iv</sup> Several studies looking at “subtract-reduce” approaches in this section make use of natural experiments or other quasi-experimental evaluation strategies. Nudges that remove steps or simplify processes, by their nature, tend to involve changes to system, state, or federal policy, which do not lend themselves as readily to RCTs compared to the additive approaches reviewed earlier.



school with a graduation rate below the city median. While some of the approaches involved more additive elements (e.g., an interactive web and smartphone app), the authors noted that the most effective of the different approaches involved sending parents a simplified, middle-school specific list of relatively high graduation rate schools, which led to students enrolling in high schools with 1.5 percentage point higher graduation rates on average.<sup>v</sup> Echoing the findings from Hastings and Weinstein (2008), this study suggests that removing steps involved in the school choice process that reduce the cognitive load of comparing and selecting a school can help families make decisions that improve academic outcomes for their children.

### **Secondary to university education transition**

Many of the doubly subtractive behavioral interventions reviewed in this article concern standardized testing, historically a necessary step in the admissions process for most selective colleges and universities. A first pair of studies investigated how subtracting steps required to take a college entrance exam affects student completion of standardized tests like the SAT or ACT and, in turn, college participation. Hurwitz et al. (2015) took advantage of a 2006 policy change in the state of Maine that required all juniors in public high schools to take the SAT, which **led to a 43% increase in the total number of students taking the test** relative to the prior year. They found that the mandate increased enrollment in four-year colleges by 2 to 3 percentage points overall, with a 10 percentage point increase among students induced to take the test. While this kind of requirement is not, strictly speaking, a nudge in line with the definition we offered earlier (it removes the option of not taking the SAT from the student's choice set) we nevertheless find it instructive because, from a behavioral perspective, the policy change removed the need for a student to consider whether to take the SAT, effectively shifting the default option. Bulman (2015) examined the proximity of test centers, finding that increased transportation costs and hassles caused by a nearby test center closing deterred students from taking tests (a 2.5 percentage point decline for students attending a high school where a center closes and a 1.4 percentage point decline for students in the neighborhood), and also that **policies that provide free in-school and default registration substantially boosted test-taking rates** (a 31 percentage point increase). Importantly, he also found that high-aptitude students whose decision to take a standardized test is sensitive to these kinds of changes are likely to eventually enroll in and graduate from college.

**Eliminating hassles or shifting defaults**—like in-school testing or automated FAFSA support—**reduces the mental and logistical toll of college prep** and drives meaningful increases in access.

Further research into college entrance exams conducted by Pallais (2015) supports the general conclusion that the removal of small fees and hassles can help students take actions associated with improved academic outcomes. She leveraged a policy change that increased the number of free score reports students who took the ACT could send to colleges from three to four, and found that students sent reports to 20% more schools on average as a result of the change. This increase in score reports resulted in low-income students attending more selective colleges on average. The incremental cost of a report was only \$6, yet the share of students sending exactly four score reports jumped from just 3% to 74%, suggesting the number of free score reports also acted as a kind of default for students.

<sup>v</sup> One additional element the authors note is that when these materials were delivered online, not in paper, they were not effective—suggesting that engagement / uptake / channel is a key mediator.











Looking outside the realm of standardized testing, Bettinger et al. (2012) evaluated similar subtractive approaches applied to the context of financial aid, which over two-thirds of college students in the United States receive in some form. The authors partnered with the tax preparation firm H&R Block to evaluate the impacts of a package of interventions designed to smooth out hassles in the financial aid application process—specifically, prepopulated applications using tax records, personal assistance from a tax preparation professional to complete the Free Application for Federal Student Aid (FAFSA), and free postage to mail the application. Compared to a control group that received only information about the financial aid process, **families in the treatment group were 15 percentage points more likely to submit an application, and their students were 8 percentage points more likely to actually enroll in college.** Taken together, these studies suggest that interventions can boost college enrollment when they both remove hassles or small costs from the process of applying to college and decrease the cognitive effort involved in deciding whether to engage in consequential tasks like standardized tests or applying for financial aid.















### University education

Student loans often make up an important part of a student's financial aid package. Marx and Turner (2019) worked with a large, urban community college to explore how different ways of communicating loan offers to students could shape their borrowing decisions. A federal formula determines how much federal loan aid a student is eligible for, but colleges themselves decide how much to offer students in their financial aid award letters. To explore whether the initial loan offers might act as a default that impact student borrowing decisions, the authors randomly assigned students to receive either a default offer of no loans (i.e., \$0), or instead around \$4,000 in subsidized loans. They found that **students who receive the nonzero default are more likely to borrow than those who receive a default offer of nothing, and this increased borrowing produces positive effects on GPA and credit attainment;** among students induced to borrow by the nudge, they found that borrowing led to roughly 3.7 additional credits attained during the academic year, and a cumulative 0.6 (out of a maximum of 4.0) increase in GPA.

**Simplifying choice architecture around loan decisions**—such as by switching default options or pre-populating responses—**helps students navigate the complexities of financial aid** more effectively and can boost credit accumulation and GPA.

In a similar study, Kramer, Lamb, and Page (2021) further demonstrated the power of defaults to shape student borrowing decisions by partnering with a large public research university to test different choice architecture around loan offers. They looked specifically at the effects of prepopulated accept or decline decisions in the software used to administer student loan packages, compared to the status quo of letting a student choose with no option preselected. They found that the **prepopulated decline decisions led to a nearly 5.0% decrease in the likelihood of a student accepting all packaged loans, and a 4.6% to 4.8% decrease in the amount of federal loans taken,** with most of the reduction in borrowing driven by drops in unsubsidized loans. Setting a default loan amount in these ways simplifies both the choice of whether to borrow, as well as potentially the decision of how and how much to borrow for some students, reducing the cognitive complexity of the financial aid process.

	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
<b>SUBTRACT-REDUCE</b>					— / ↓
PreK-12	<b>Bergman, Lasky-Fink, &amp; Rogers (2018):</b> <b>Opt-out enrollment for progress monitoring technology:</b> Defaulting parents into enrollment to use technology that provides high-frequency, actionable info about their child's academic progress.	 ACADEMIC PERFORMANCE	↑ 0.05-0.06 increase in GPA ↓ 10% reduction in course failures	 LOCAL	12 Washington D.C. middle and high schools
	<b>Cohodes et al. (2022):</b> <b>Simplified school information / search:</b> Informational intervention providing parents of middle school students simplified information on quality of local high schools, along with a recommendation app and school finder to ease the search process.	 SCHOOL CHOICE	↑ Simplified information reduced applications and enrollment in low-graduation rate schools by 3.1 percentage points and 6.1 percentage points, increased average graduation rate of enrolled schools by 1.5 percentage points; App and school finder showed similar effects of smaller magnitude	 MUNICIPAL	New York City Department of Education (NYCDOE)
	<b>Hastings &amp; Weinstein (2008):</b> <b>Simplified school quality information campaign:</b> Informational intervention sending parents of middle school students simplified info on quality of local high schools to inform school choice.	 SCHOOL CHOICE	↑ 5-7 percentage points increase in parents choosing higher-performing schools ↑ 0.05-0.1 SD increase in students' test scores	 MUNICIPAL	Charlotte-Mecklenburg Public School District (CMS)
College Access	<b>Bettinger et al. (2012):</b> <b>FAFSA simplification and assistance:</b> Individualized assistance completing FAFSA from tax preparation professionals, with FAFSA pre-populated with tax return info.	 FINANCIAL AID APPLICATION	↑ Among dependent students, 15.7 percentage points (40% increase) more likely to file the FAFSA and 7.7 percentage points (29% increase) more likely to enroll in college	 REGIONAL	H&R Block, U.S. Department of Education (DOE) and the National Student Clearinghouse (NSC)
	<b>Bulman (2015):</b> <b>Opt-out SAT registration:</b> Free in-school registration, nearby testing centers, and defaulting students into taking the SAT.	 RESOURCE UPTAKE	↑ In-school default SAT test increases test taking by 31 percentage points pre-post	 NATIONAL	No partners mentioned

	Authors (Year) / Description	Primary Outcome	Estimated Effect	Scale	Partner(s)
College Access	<b>Dynarski et al. (2021):</b> <b>Early commitment of free tuition:</b> Campaign that guaranteed high-achieving students the same grant aid that they would qualify for in expectation if admitted before they applied, eliminating uncertainty around the cost of attending.	 COLLEGE ENROLLMENT	<ul style="list-style-type: none"> <li>↑ 42 percentage points increase in application rates</li> <li>↑ 17.6 percentage points increase in admission</li> <li>↑ 15 percentage points increase in enrollment rates</li> </ul>	LARGE PSE INSTITUTION 	University of Michigan
	<b>Hurwitz et al. (2015):</b> <b>SAT graduation requirement:</b> State policy change making the SAT a high school graduation requirement.	 COLLEGE ENROLLMENT	<ul style="list-style-type: none"> <li>↑ Increased 4-year college-going rates by 2 to 3 percentage points</li> </ul>	STATEWIDE 	Data from College Board, National Student Clearinghouse (NSC), National Center for Education Statistics (NCES), and US Census
	<b>Kramer, Lamb, &amp; Page (2021):</b> <b>Student loan default option:</b> Pre-populated accept or decline decisions in the software used to administer student loan packages.	 STUDENT BORROWING	<ul style="list-style-type: none"> <li>↓ 4.6% - 4.8% decrease in the amount of federal loans taken</li> </ul>	LOCAL 	Anonymous selective public four-year college
	<b>Pallais (2015):</b> <b>Free additional ACT score report:</b> Policy change allowing students to send an ACT score report to an additional college for free.	 SCHOOL CHOICE	<ul style="list-style-type: none"> <li>↑ ACT-takers sent more college applications and low-income ACT-takers attended more selective colleges</li> </ul>	NATIONAL 	Datasets from the ACT Corporation and the American College Survey (ACS)
College Success	<b>Apostolova-Mihaylova et al. (2015):</b> <b>Loss framing of grades:</b> Endowing students with full marks at the beginning of a semester and having them lose points as they progress.	 ACADEMIC PERFORMANCE	<ul style="list-style-type: none"> <li>— No impact overall, but there was a heterogeneous gender effect: treatment males scored between 3.17 and 4.05 percentage points higher than control males, but treatment females scored between 3.61 and 4.36 percentage points lower than control females</li> </ul>	LARGE PSE INSTITUTION 	University of Kentucky (economics department)
	<b>Carter et al. (2017):</b> <b>Classroom computer usage restriction:</b> Prohibiting computer usage in the classroom.	 ACADEMIC PERFORMANCE	<ul style="list-style-type: none"> <li>↓ Reduction of 0.18 SDs in final exam scores for classes that permit computers (concentrated to unrestricted computer and slightly restricted tablet use)</li> </ul>	LOCAL 	United States Military Academy (West Point)
	<b>Marx &amp; Turner (2019):</b> <b>Student loan opt-out framing:</b> Financial aid letters including non-zero student loan offers by default.	 COLLEGE PERSISTENCE & COMPLETION	<ul style="list-style-type: none"> <li>↑ 30% increase in credits earned that year (3.7 additional credits) and GPA (by 0.6)</li> </ul>	LARGE PSE INSTITUTION 	An anonymous community college

# DISCUSSION

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One of the clearest findings from this review is the critical role that reducing cognitive load plays in the success of educational nudges. Consistent with the concept of additivity bias explored by Adams, Converse, Hales, and Klotz (2021), we find that the designers of nudges tend to favor additive changes relative to subtractive changes when developing ways to support students. We argue that these designers should prioritize subtraction not only in terms of elements in a solution space but also along this additional dimension, seeking to reduce the cognitive load their interventions impose on students and their families.

Interventions that simplify processes or eliminate unnecessary steps in ways that make decisions easier—what we refer to as “subtract–reduce” approaches—consistently yield the largest gains in academic outcomes. For instance, streamlined financial aid applications or enrollment forms significantly enhance decision-making and follow-through. These findings align with a broader behavioral science literature emphasizing that reducing friction and complexity can lead to outsized benefits, particularly for students from historically marginalized backgrounds who may already face significant resource constraints.

Interventions that **simplify processes or eliminate unnecessary steps** in ways that make decisions easier—what we refer to as “subtract–reduce” approaches—**consistently yield the largest gains in academic outcomes.**

In contrast, “add–increase” interventions, which increase both the tasks required of students and the demands on their cognitive resources, tend to yield mixed or null results, despite being the most common category of nudge found in our review. While these interventions are well-intentioned, and aim to provide more resources or support, they may implicitly expect greater and more independent cognitive investment in complex tasks than is feasible for students and families.

There is, however, an important, and to this point unacknowledged, subset of additive interventions—those we refer to as “add–reduce” approaches. We find that approaches that make decisions easier to process or actions easier to take by adding new elements to a solution space—for example, providing students or their families with tools that allow them to compare difficult to evaluate options in a choice set—can avoid the trap that undermines the effectiveness of other additive approaches.

The key takeaway from this review is that **designers of educational nudges should prioritize approaches that are subtractive, both in terms of the complexity of processes and systems and also in terms of the cognitive demands on students and their families; and when fully subtractive nudges are not possible, they should aim to design additive nudges that decrease the cognitive load imposed on students and their families.**

In this final section, we conclude this review by spotlighting three additional biases that we believe undermine the effectiveness of many nudges (particularly “add–increase” approaches) aimed at improving educational outcomes in the United States—and, if addressed, could increase nudge efficacy.

## Addressing messenger neglect

The first factor we consider is the underappreciated importance of the messenger in effective nudges. Behavioral interventions often focus on developing content that leverages a behavioral science principle or insight without sufficiently focusing on the sender's identity and relationship with the recipient. In our experience working with a range of partners to design and test nudges, far more time is spent crafting the message content than on finding the right messenger, when it may be the sender that is the more decisive factor for the success of the campaign. The first reason is attentional: We're just more likely to notice and engage with a message if it comes from someone we know. The second reason is that the sender of a message interacts in important ways with the content of the message—for example, by boosting its credibility.

We are more likely to notice and engage with a message if it comes from someone we know.  
***The sender of a message can have a bigger impact than the contents of the message.***

Evidence from our review suggests that ***messages delivered by trusted, local, and human messengers—such as teachers, counselors, or community-based advisors—are more likely to engage recipients and lead to meaningful action.*** By contrast, interventions relying on generic, institutional, or automated senders often fail to achieve similar levels of engagement. One increasingly pervasive instance of messenger neglect is the urge to replace human senders with automated chatbots; while there is an obvious appeal to this approach from a cost-effectiveness perspective, we believe attempting to replicate human-driven nudges with machine senders misunderstands a key component of effective nudges.

***To boost the effectiveness of nudges, practitioners should carefully consider the messenger's role and its interaction with message content, giving equal if not greater weight to the sender.***

This may involve investing in local partnerships, tailoring messages to specific communities, or combining digital tools with human touchpoints to maintain credibility and engagement.

## Avoiding the low-hanging-fruit trap

A second lesson from this review is the tendency of behavioral interventions to focus on “low-hanging fruit”—incremental improvements that are cost-effective and scalable but may crowd out deeper, more systemic solutions. For example, while text-based reminders and informational campaigns are relatively easy to implement, they often focus on mitigating surface-level barriers rather than the underlying structural issues, limiting the full potential of behaviorally informed design in education. This focus on cheap and incremental solutions also risks exacerbating inequities in educational outcomes, because the barriers faced by historically marginalized communities often require deeper solutions.

Future behavioral interventions should ***strike a balance between scalability and depth,*** not solely on cheap and incremental solutions.



***Future efforts should strike a balance between scalability and depth, integrating behavioral insights into broader initiatives that address root causes of educational disparities.*** This can often be achieved by pairing nudges with more intensive supports to ensure students facing heightened challenges or complexities are not left behind—for example, pairing autopopulated financial aid forms with the option to receive personalized Q&A from a tax professional, as in the FAFSA nudging campaign evaluated by Bettinger et al. (2012).

## **Leading with a diagnosis, not a solution**

Finally, our review underscores the importance of a diagnosis-driven approach when designing nudges. Too often, the design process begins with a predetermined solution rather than a thorough understanding of the problem at hand. This scenario often arises from a well-intentioned effort to replicate an approach that worked in one context to another that appears at least superficially similar, potentially leading to a mismatch between design and diagnosis. For example, providing parents of young children with information about the quality of childcare centers in their community may not influence families' choices if parents have to prioritize options with the most flexible hours.

***Effective nudges require a diagnostic phase that hypothesizes the root causes of educational challenges and then validates them through direct investigation of the context students are navigating.*** By grounding solutions in a comprehensive understanding of the barriers students and their families are facing, practitioners can design nudges that are both targeted and impactful.



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