Testing an Intervention to Improve Academic Achievement among Students on Academic Probation

Nicholas A. Bowman, Nayoung Jang, D. Martin Kivlighan III, and Nancy Schneider

University of Iowa

Ye Xiaomeng

Indiana University

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Correspondence concerning this article should be addressed to Nicholas A. Bowman, Department of Educational Policy and Leadership Studies, University of Iowa, N438A Lindquist Center, Iowa City, IA 52242, nick-bowman@uiowa.edu, 319.335.5372 (office). The authors thank the students and faculty in the Center for Research on Undergraduate Education at the University of Iowa as well as Rocío Titiunik at the University of Michigan for their helpful feedback on this project.

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Abstract

Many degree-seeking college students struggle academically and ultimately never graduate. Academic challenges and persistence within the major are especially salient issues for students who major in science, technology, engineering, and mathematics (STEM). Academic probation serves as a means for informing students that they are at risk of dismissal, and many colleges and universities offer services to help students placed on probation to succeed academically. This paper presents two studies that examined the effectiveness of a goal-setting academic advising intervention for improving the grades of engineering students who were on academic probation; one study used a regression discontinuity design, and the other used an experimental design. The findings of both studies support the same overall conclusion: The intervention notably increased the grades of engineering students on probation who are beyond their first year of college, but it was not effective for students in their first year. This brief academic enhancement intervention appears to constitute a cost-effective strategy for bolstering the academic success of at-risk college students after their first year.

Keywords: academic probation, college students, engineering, goal setting, academic advising

The academic success and retention of postsecondary students continue to be a problem for colleges and universities. Approximately 21% of adults over the age of 25 have obtained some college-level education but have failed to receive a college degree (U.S. Census Bureau, 2014). In addition, fewer than 50% of students who intend to obtain a baccalaureate degree successfully graduate within four years (Cataldi et al., 2011). Considerable attention has been paid to students in science, technology, engineering, and mathematics (STEM), since persistent challenges exist within these fields of study. Overall, 48% of students who pursued a bachelor's degree in STEM between 2003 and 2009 were no longer in a STEM field by Spring 2009 (Chen, 2013). Among students who change fields of study while persisting in college, this movement occurs almost exclusively in a single direction: 36% of students who started as STEM majors switched to a non-STEM major, whereas only 7% of students who started as a non-STEM major moved into a STEM major (Chen & Weko, 2009). This disparity is likely driven, at least in part, by the more stringent grading practices and/or difficult content within STEM coursework (e.g., Johnson, 2003). Moreover, changes within the U.S. economy have resulted in the need to increase substantially the number of STEM-educated college graduates (e.g., Business Roundtable & Change the Equation, 2014; Holdren & Lander, 2012), which makes the issue of STEM success even more important.

Given the staggering rates at which students in various majors fail to persist to degree completion, colleges and universities have devoted substantial resources to student success and retention. As an illustration of these efforts, four-year public degree-granting institutions spent an average of $2,813 on academic support and $1,649 on student services per full-time student in 2014-2015 (Snyder, de Brey, & Dillow, 2018). Unfortunately, the effectiveness of such efforts seems to vary substantially; some interventions appear to be highly effective, while many others

appear to have no impact on student success (for a review, see Mayhew, Rockenbach, Bowman, Seifert, & Wolniak, 2016).

At many institutions, students who are struggling academically are placed on academic probation if their semester grade point average (GPA) and/or overall GPA drops below a certain threshold. These students may then be dismissed from the institution if their grades do not improve sufficiently. Unfortunately, a large number of students ultimately find themselves on academic probation. In fact, Schudde and Scott-Clayton (2016) found that approximately 20% of first-year students nationally in 2012 received a college GPA below 2.0, which is a commonly used cutoff for academic probation. Given the fact that these students are at high risk of attrition, a variety of strategies have been developed to assist students on academic probation, with some promising findings for the role of academic advising (Kirk-Kuwaye & Nishida, 2001; Molina & Abelman, 2000) and goal-setting interventions (Morisano, Hirsh, Peterson, Pihl, & Shore, 2010) in boosting subsequent college grades. Despite the potential of interventions to improve these students' success, few studies have been sufficiently rigorous to establish this causal impact.

This paper sought to provide strong evidence about the effectiveness of an advisor-based goal-setting intervention for engineering students on academic probation. Specifically, we conducted two studies to provide insights into whether this approach may promote students' academic achievement. The first study utilized regression discontinuity analyses within a large sample of engineering students, while the second study utilized an experimental design to compare engineering students on academic probation who received (or did not receive) a request to participate in an advisor-based goal-setting intervention.

Characteristics of Students on Academic Probation

As a first step in understanding students on academic probation, researchers have compared the characteristics of these students to their peers. Relative to students in good standing, students on probation tend to have lower high school GPAs (Trombley, 2000) and report more motivational and stress-related problems (Isaak, Graves, & Mayers, 2006). Additionally, males and younger students are more likely to be placed on academic probation (James & Graham, 2010; Mathies, Gardner, & Webber-Bauer, 2006), along with students who report family difficulties (Ramirex & Evans, 1988) and family obligations such as child care (Trombley, 2000). The amount of need-based financial aid is also associated with a greater likelihood of being placed on academic probation, whereas Greek organization membership is associated with a reduced likelihood of probationary placement (Mathies et al., 2006).

Interestingly, Smith and Winterbottom (1970) found that the amount of effort studying, distraction from academic work (e.g., daydreaming), and participation in extracurricular activities did not differ between students on academic probation and those in good academic standing. However, students on academic probation had less realistic expectations and aspirations in their academic work (e.g., overestimating the grades that they would later receive) than students in good academic standing. Other studies identified related factors that predicted probationary placement, including improper course selection (Ahmed, Chowdhury, Rahman, & Talukder, 2014; Ramirex & Evans, 1988), poor course scheduling (Ramirex & Evans, 1988), and lack of academic goal clarity (James & Graham, 2010). Given the multitude of factors associated with a student being placed on academic probation, it is not surprising that a variety of strategies have been developed to help students on academic probation return to good academic standing.

Existing Interventions for Students on Academic Probation

Interventions for students on academic probation can largely be divided into two categories: (1) those that occur in classroom or workshop settings, and (2) those that occur through meetings with advisors or counselors (Kamphoff, Hutson, Amundsen, & Atwood, 2007). The majority of classroom/workshop interventions typically focus on skill acquisition, such as time management, note-taking, test-taking, and goal-setting (McGrath & Burd, 2012; Mellor et al., 2015). In contrast, advising/counseling interventions often involve students working one-on-one with advisors, counselors, or mentors to reflect on previous academic performance, establish clear goals for moving forward, and identifying methods for achieving these goals.

Despite the preponderance of strategies for assisting students on academic probation, few studies have examined the impact of such approaches for STEM students on academic probation. Moreover, regardless of field of study, the majority of intervention studies have not used experimental or quasi-experimental designs to test casual relationships, and they often do not examine changes in students' academic performance over time or sometimes even control for confounding variables. Ideally, research that does not employ experimental or quasi-experimental designs would control for constructs that may differ between probationary and non-probationary students, including demographics, precollege academic achievement, psychological factors, finances, college engagement, and responsibilities outside of college (e.g., Isaak et al., 2006; James & Graham, 2010; Mathies et al., 2006; Ramirex & Evans, 1988; Trombley, 2000). The previous literature commonly focuses on the implementation of intervention programs within an institution, and it documents the effectiveness of such interventions by reporting academic outcomes (e.g., retention rates, GPA) for students receiving the intervention. However, many of these studies simply provide descriptive statistics without formally testing for group

differences or accounting for control variables (e.g., Humphrey, 2006; Preuss & Switalski, 2008; Rojas, Knauft, Broder, & Campbell-Burden, 2002; Wlazelek & Coulter, 1999), or these do not include a comparison group of non-probationary students at all (e.g., Austin, Cherney, Crowner, & Hill, 1997; Heerman & Maleki, 1994).

Academic Advising and Student Outcomes

Academic advising has long been viewed as central to promoting students' academic development and success in college (Gordon, Habley, & Grites, 2011; Young-Jones, Burt, Dixon, & Hawthorne, 2013). Previous findings suggest that time spent interacting with advisors is positively associated with college GPA (Kot, 2014) as well as retention and graduation (see Tinto, 2012). An experimental study of low-income community college students found that students who were randomly assigned to meet at least twice per semester with an academic advisor (and paid a modest stipend if they did so) had greater retention than students in the control condition (Scrivener & Weiss, 2009). Advising could be especially effective for students on academic probation, because students who are academically at-risk tend to be less connected with college personnel such as faculty and advisors (Kuh & Hu, 2001). Indeed, many students who are placed on academic probation report that they had never engaged in an individual conversation with instructors or advisors before the intervention program (Kamphoff et al., 2007; Ramirex & Evans, 1988), so advising interventions represent one method for enhancing students' level of connection to key professionals on campus. Students on probation who participate in advising-based interventions tend to be satisfied with them; in one study, students reported that the program helped them feel connected to others by requiring them to attend a regular meeting with facilitators and providing guidance to be successful in college (Humphrey, 2005).

A small body of research has examined the effects of intrusive advising for students on academic probation with promising results. Intrusive advising involves "personal contact, generating student responsibility for problem solving and decision making, assisting students in identifying resolvable causes of poor academic performance, and offering negotiated agreements for future actions" (Vander Schee, 2007, p. 50). Moreover, Earl (1988) argued that advising is intrusive if it involves reaching out to students before a problem becomes too substantial and it leads to academic adjustment. The effectiveness of intrusive advising for students on academic probation has been shown in a number of studies. For example, Molina and Abelman (2000) randomly assigned students on academic probation to three types of advising that differed in levels of intrusiveness. The most intrusive form of advising resulted in greater grade point average and retention rates relative to the least intrusive approach. Kirk-Kuwaye and Nishida (2001) conducted three experimental studies to compare differing levels of intrusiveness on the academic outcomes of students on academic probation, and they similarly found that the group receiving the highest advisor involvement outperformed the group receiving the lowest advisor involvement. In contrast, Schwebel et al. (2012) compared intrusive advising to no advising and identified no significant effect; this result likely occurred because a low proportion of students in the treatment condition actually accepted the request to participate in the advising meetings. Taken together, it appears that advising-based interventions—and particularly those that involve intrusive advising—may be an effective means of enhancing the academic performance of students on probation.

Goal-Setting Theory

Goal-setting theory was first introduced in the field of business (Locke, 1964; Locke & Latham, 1990); however, goal-setting theory has been refined and adapted for the college student

population (Donovan & Williams, 2003; Hollenbeck, Williams, & Klein, 1989). Within an educational setting, goal-setting theory assumes that students who set goals tend to perform at higher levels than students who do not set goals (Friedman & Mandel, 2009). Goal-setting is theorized to positively influence an individual's motivation, effort, persistence, and ultimately performance (Sorrentino, 2006). In accordance with social-cognitive learning models, goal setting is intrinsically related to both self-efficacy and goal commitment (Zimmerman, Bandura, & Martinez-Pons, 1992). As Morisano and colleagues (2010) noted, "as a student experiences successful goal attainment, self-efficacy increases; this in turn enhances goal commitment and mobilizes the self-regulation of cognitive and motivational resources to facilitate subsequent achievement" (p. 256). In addition to the theoretical support for the importance of goal-setting, a large body of research provides additional empirical support for the role of goal-setting in academic success (for a review, see Robbins et al., 2004).

According to Sorrentino (2006), "goal-setting theory assumes that people are motivated to complete goals when there is a discrepancy between where they would like to be and their current status" (p. 242). Therefore, goal-setting may be even more important for students on academic probation, who may experience discrepancy between their past academic performance and their academic goals. One relevant study employed a qualitative design to examine the experiences of nine ethnically diverse students who faced academic difficulty, finding that students appeared to be more able to overcome academic challenges when they set clear career goals (Hwang et al., 2014). Another study examined the effect of a goal-setting intervention by randomly assigning 85 undergraduates on academic probation to a self-directed goal-setting intervention or a control group (Morisano et al., 2010). They found that students who completed

the goal-setting intervention showed significant improvement in their academic performance, as measured by longitudinal changes in their grade point average, relative to the control group.

Goal-setting research suggests that goal specificity, relevancy, challenge, commitment, participation, feedback, and peer competition all enhance performance (e.g., Locke & Latham, 1990; Mento, Steel, & Karren, 1987; Tubbs, 1986). Students who participate in the goal-setting process and establish specific, relevant, and challenging goals should experience greater goal attainment and success. Therefore, an advisor-based goal-setting intervention that assists students on academic probation in collaboratively establishing specific and appropriately challenging goals may prove successful in enhancing student academic performance. In general, the potential for goal-setting approaches for students on probation is promising, but much more evidence is needed to understand whether and under what conditions these may be useful.

Present Research

We conducted two studies to test the effectiveness of an advisor-based goal-setting intervention on the academic performance of engineering students on academic probation. The first study used quasi-experimental analyses of registrar data, whereas the second study randomly assigned students to be requested (or not) to participate in the intervention. The present research expands and improves upon previous research in several ways. First, it used experimental and quasi-experimental designs to draw stronger causal conclusions about the impact of an advising-based intervention. Second, it examined students who were in a difficult undergraduate STEM major (i.e., engineering), whereas previous experimental studies examined students in a variety of majors largely at open-access or less selective institutions (Kirk-Kuwaye & Nishida, 2001; Molina & Abelman, 2000; Scrivener & Weiss, 2009). Third, the treatment employed a goal-setting approach that was based on well-established theory (Locke & Latham,

1990, 1994, 2002), with some evidence supporting this strategy for improving the outcomes of students on academic probation (Morisano et al., 2010). Fourth, the intervention in this study consists of a single brief advising meeting, so it necessitates far less time and resources than most intrusive advising approaches, which may involve frequent meetings and outreach to the student as well as to faculty and other staff members (e.g., Earl, 1988; Varney, 2007). As a result, this study explores a relatively cost-effective approach for bolstering academic success.

Based on previous theory and research, we hypothesized that this advisor-based goal-setting intervention would have a positive effect on the grades of engineering students on academic probation in both studies. In Study 2, we also expected that students who were invited to participate in the treatment would be more likely to return to academic good standing than those who were not. Although we had no a priori expectations about the direction of moderation effects, we explored potential differences in the impact of the intervention as a function of students' year in school and their demographic characteristics.

Study 1

Study 1 used regression discontinuity (RD) analyses to examine the effect of receiving a semester GPA below the threshold for academic good standing versus above the threshold. Students who were below the GPA threshold were requested to participate in the advisor-based goal-setting intervention. A condition for drawing causal conclusions from RD analyses is that only the treatment of interest (in this case, the provision of the advisor-based goal-setting intervention) should be affected by scoring just above or below the cutoff. However, this assumption does not hold in the present study, because receiving a semester GPA below a 2.0 leads simultaneously to (a) being placed on academic probation, and (b) receiving a request to complete the intervention. Placement on academic probation is not an intervention per se, but

this designation itself could affect students' subsequent performance either positively or negatively. On the positive side, students may become more motivated by the fact that they need to improve their GPA to remain in the university's College of Engineering. Conversely, students may interpret a probationary placement as indicating that they are not able to succeed in engineering, which would therefore reduce their motivation and subsequent performance.

Most available evidence indicates that students exhibit adverse reactions and outcomes from probationary placement. Students describe their experience of entering academic probation in strongly negative terms (Brady et al., 2019). Many students report wanting to disengage from school; feeling embarrassed, ashamed, and sad; and not knowing what to do next. They also view probation very differently than administrators, who often think that academic probation would serve to connect students with helpful resources and let them know that staff and faculty are concerned and care about them (Brady et al., 2017). Consistent with students' subjective experiences, a meta-analysis of eight experimental or quasi-experimental studies found that being placed on academic probation resulted in lower retention rates, but no significant effect on graduation rates (Sneyers & De Witte, 2018). However, among students who do not leave the institution, probationary placement does not appear to decrease first-year students' subsequent GPA, with previous research identifying a mix of positive and nonsignificant relationships (Chi & Dow, 2014; Fletcher & Tokmouline, 2017; Lindo, Sanders, & Oreopoulos, 2010; Schudde & Scott-Clayton, 2016). It is unclear what types of programs, if any, the institutions in these prior studies used to assist students on academic probation. Taken together, it seems that mere placement on academic probation generally does not improve student outcomes; if anything, the opposite is more likely to be true.

Method

Participants. The sample consisted of 3,164 students who attended a large, public Midwestern university and started as an engineering major from Fall 2008 to Summer 2016. Among these participants, 24% were female, 77% were White/Caucasian, 6% were Latinx/Hispanic, 4% were Asian American/Pacific Islander, 4% were international students, 2% were Black/African American, 2% were multiracial, and 4% were other or unknown race/ethnicity. As a result of a university software system change during the period of the study, first-generation status and high school GPA were only available for approximately 60% of participants. Among those students with valid data, 20% were first-generation college students, and the average weighted high school GPA was 3.78.

Measures. The key independent variable in each RD analysis (i.e., the running variable) was semester GPA. Grades at the participating institution include pluses and minuses, and the semester GPA is calculated by multiplying the number of grade points for each course by the number of credits for that course and then computing the average (e.g., a C+ in a four-credit course and a C- in a three-credit course would result in a semester GPA of [2.3 x 4 + 1.7 x 3]/7 = 2.04). Because engineering and pre-engineering courses vary considerably in the number of credits, and because students generally take several courses per semester, the semester GPA can take numerous values that are close to the probationary cutoff of 2.0. The analyses used GPAs from the each of the first five college semesters as running variables, since many of the falsification and sensitivity checks discussed below could not be conducted properly for the sixth semester or beyond as a result of small sample sizes below the cutoff score.

The dependent variable was GPA in the following semester, which was the semester in which students below the cutoff were on probation. For instance, the analysis that used Semester

1 GPA as the running variable predicted Semester 2 GPA as the outcome. High school GPA was used as a pretreatment variable in the falsification analyses; this GPA was weighted to provide additional points for taking honors and Advanced Placement courses. Although several different GPA measures were used, the vast majority of correlations were moderate for high school GPA with college semester GPAs (*r*s = .30-.50) and among the college semester GPAs (*r*s = .35-.55). Variables used to explore potential moderation effects included first-generation college student (yes/no), race/ethnicity (students of color versus White students), and high school GPA (using different cutoffs at 3.5 and 3.6).

Procedure. The advisor-based goal-setting intervention consisted of two phases. First, students completed a performance improvement plan worksheet, which consisted of students reflecting on their previous academic performance, identifying barriers to academic success, setting specific course-related goals for moving forward, and developing strategies for accomplishing their stated goals. Students initially responded to the paper worksheet to address these questions independently. As a second step, students engaged in a half-hour meeting with an academic advisor to discuss their written responses; to further identify, revise, and/or refine strategies for academic success; and to enhance commitment to their goals.

As Locke and Latham (1990, 2006) theorized, setting specific goals may directly enhance task performance, so we expected that engineering students on academic probation who set specific goals and identified strategies for academic success would have improved academic performance in the subsequent semester. In contrast to intrusive advising, which often involves multiple meetings, this intervention consisted of one half-hour meeting with the advisor, and students who did not respond to the request were not sent repeated reminders to attend the meetings. As a result, this approach likely does not constitute intrusive advising per se, since it

does not fit the entire definition. That said, this intervention drew from principles of intrusive advising in that it aimed to generate student responsibility for problem solving and decision making, and it assisted students in identifying strategies and goals for academic success (Vander Schee, 2007).

Analyses. Local linear regression discontinuity analyses were conducted using the rdrobust program in Stata 14 (for information about this software and corresponding techniques, see Calonico, Cattaneo, Farrell, & Titiunik, 2017; Calonico, Cattaneo, & Titiunik, 2014). Given that this study sought to examine the potential effect of an advising-based intervention in engineering, each analysis only examined students who were still enrolled as engineering majors. As a result, the available sample size decreased in later semesters (e.g., in the junior year), as students changed to a different major or left the university. The sample size in later semesters was also reduced by the fact that some students started college toward the end of the data collection period, so they had not yet progressed to their senior, junior, or sophomore year. These students were excluded from any analyses for which they did not have valid GPA measures. This study employed a sharp RD design, because all students who received a semester GPA below 2.0 were placed on academic probation, and all students within the analytic sample who received at least a 2.0 semester GPA were not on probation.[1]

A mean squared error (MSE)-optimal bandwidth was determined for each analysis to provide the best possible combination of reducing bias and increasing precision. Given that far more participants were above the cutoff than below, different MSE-optimal bandwidths were selected on each side of the cutoff to yield an appropriate sample size for each group. For this same reason, a uniform kernel was used rather than a triangular kernel, as the latter approach may largely base its estimate on a small number of participants just below the cutoff.

Some scholars argue for the inclusion of covariates to increase the precision of the RD treatment effect estimate (e.g., Frölich & Huber, 2017). Therefore, we conducted analyses with and without students' race/ethnicity and sex as covariates; both of these demographics are well-established predictors of college GPA (Richardson, Abraham, & Bond, 2012; Voyer & Voyer, 2014; Young, 2001), and we had virtually complete data on them. As noted earlier, substantial missing data were observed for high school GPA and first-generation college status, so neither of these variables was used as a covariate.

Results and Discussion

Before conducting the primary analyses, several falsification analyses were performed to test the robustness of the results and whether the assumptions of RD analyses were met (see Cattaneo, Idrobo, & Titiunik, in press; Lee, 2016; McCrary, 2008). First, the density of the distribution for each running variable was examined to ensure that students did not manipulate their GPA to meet or barely exceed the threshold for academic good standing. Such manipulation seems very unlikely, since grades are provided by instructors, and the semester GPA constitutes the average of several instructors' grades. Successful manipulation seems especially unlikely among engineering majors at this university for the following reasons: (a) many courses are graded on a curve, so it is very difficult for students to predict their final grade before it is actually assigned; (b) students take courses that often contain different numbers of credit hours (and the semester GPA constitutes a weighted average of those courses), which further complicates attempts to predict GPA; and (c) instructors virtually never change a final grade after it is assigned. As expected, local polynomial density estimates with robust statistics showed that the density of the distribution did not differ significantly above and below the cutoff for any of the five semester GPAs used as running variables, *p*s > .16.

Second, regression discontinuity analyses used pre-treatment continuous variables as outcomes to ensure that no discontinuities were obtained for "effects" that temporally preceded the treatment. In other words, if students who are near the cutoff happen to be just above or below a 2.0 GPA by random chance (as RD assumes), then those students' pre-existing attributes should not differ in any meaningful way on either side of the cutoff. High school GPA was the only available continuous pre-treatment variable when Semester 1 GPA was used as the running variable, but one or more prior college semester GPAs could also be used when the running variable was Semester 2 or later. Only one of the 15 different tests was significant at $p < .05$ (i.e., the cutoff for Semester 5 GPA predicting Semester 3 GPA). Given the fairly large number of tests, the presence of one significant finding is consistent with what would be expected by random chance if no significant differences exist within the population.

Third, different GPA cutoffs were used to ensure that no GPA threshold exhibited discontinuities besides the one associated with the treatment. This approach provides indirect evidence for the RD assumption (which cannot be tested directly) that there would be no discontinuity at the treatment cutoff if the treatment had not been administered. In the present study, the most relevant potential concern pertains to GPA requirements for financial aid eligibility, since students can become ineligible for aid based on low academic performance. However, this assumption appears to be valid for the present study, because different financial aid sources have different GPA requirements, and the university's standards for satisfactory academic progress consist of a combination of cumulative institutional GPA (not by semester) as well as the proportion of credits earned to credits attempted (both by semester and cumulatively). In short, financial aid eligibility differs substantially from the criterion used to determine good academic standing. Aside from using a different cutoff, these falsification analyses were the

same as the primary analyses, with GPA in one semester predicting GPA in the following semester. The choice of artificial cutoffs was somewhat arbitrary; we decided to use two other GPA thresholds that consisted of round numbers and that contained many students on both sides: 2.5 and 3.0 (we had originally tested 1.5 to provide a cutoff on the left side of the probationary threshold, but the sample sizes below this point were generally not sufficient to conduct the analyses). Nine of the 10 results were non-significant, but one was significant at $p < .05$ (i.e., a 3.0 cutoff for Semester 3 GPA predicting Semester 4 GPA). However, this result may not be meaningful, since only two of the 30 total falsification tests were significant at $p < .05$, which is consistent with what would be expected via random chance from Type I error.

Fourth, additional analyses made different analytic choices to ensure that the preceding results were not idiosyncratic to particular model specifications. These sensitivity analyses showed that the results were similar when using the same bandwidth on both sides of the cutoff versus using different bandwidths. Preliminary analyses also showed that the results were generally similar when using a triangular kernel versus a uniform kernel. The lone exception to this consistency is that analyses using Semester 4 GPA as the running variable sometimes yielded divergent results when covariates were included in the model in combination with some specific kernel and bandwidth choices. Those particular covariate-based analyses tended to have narrower MSE-optimal bandwidths, which then resulted in smaller sample sizes and therefore lower statistical power.

The findings for the primary RD analyses are presented in Table 1. Falling above or below the 2.0 GPA cutoff for academic probation in either of the first two semesters was not significantly associated with GPA in the following semester. In contrast, students who were just below the cutoff in Semesters 3 and 4 had GPAs that were 1/4 to 1/3 of a grade point higher than

those who had barely exceeded the threshold for academic good standing. Depending upon the semester and inclusion of covariates, these results were statistically significant at a conventional criterion ($p < .05$) or a more lenient criterion ($p < .10$). In addition, falling just below the academic probation cutoff in Semester 5 resulted in a statistically significant positive effect of about 2/3 of a grade point. A visual display of each of these results appears in Figure 1. The graphs suggest that virtually no discontinuity existed in the first two semesters, whereas students who were near the 2.0 cutoff on the left side had notably higher grades in the following semester than those on the right side in the last three semesters (each dot represents the average among students within a bin of .10 GPA units).

Supplemental analyses examined subgroups that were divided by race/ethnicity, sex, and high school GPA to consider whether these effects differed systematically based on students' precollege characteristics. The findings were typically similar across groups, and any apparent variation in effects between subgroups was not consistent across semesters or analytic decisions. Additional analyses also showed that the relationships were similar when examining students in earlier years of the sample (i.e., late 2000s and early 2010s) versus later years. Thus, those extensive results are not presented here.

Summary

Being placed on probation (and therefore receiving a request to participate in the advisor-based goal-setting intervention) was unrelated to GPA in students' first year, but it appeared to promote subsequent GPA in the second and third years. As mentioned earlier, the present analyses cannot conclusively disentangle the potential causal influence of the intervention itself from the effect of being placed on academic probation, which comes with the resulting risk of

dismissal from the College of Engineering. It is important to emphasize that this study was not designed or intended to provide conclusive evidence for such causal claims.

That said, this study provides some important contributions. Prior research on first-year students has sometimes found that being placed on academic probation may increase these students' grades (albeit reducing their retention rates; see Fletcher & Tokmouline, 2017; Lindo et al., 2010), so the non-significant effects in the first two semesters of the present study indicate that being placed on probation does not automatically lead to greater motivation and performance among students who persist. Moreover, the large sample size and examination of numerous analyses helped delineate the conditions in which probationary placement was associated with larger effects (after the first year of college) versus attributes that are largely unrelated (demographics and high school GPA).

Study 2

The purpose of Study 2 was to address the limitations of Study 1. Students who were placed on academic probation as a result of their semester grades were randomly assigned to receive (a) an email message stating that they needed to complete the advisor-based goal-setting intervention, or (b) an email message that did not invite students to do so. All participants in this study were on academic probation, which avoids the earlier problem of confounding probationary status with being offered the treatment. In addition, RD analyses are well-suited to making causal conclusions for participants who are close to the cutoff, but they are less effective for making judgments about participants who are further from the cutoff. Students in Study 2 exhibited a wide range of semester GPA, so the conclusions are not limited to those who were near the 2.0 GPA cutoff.

Method

Participants. Participants were 113 engineering majors who were placed on academic probation as a result of their low semester GPA in Fall 2016 and who remained in engineering at the start of Spring 2017. Overall, 60% of participants were White, 13% were Latino/Hispanic, 12% were Black/African American, 7% were international students, 5% were Asian/Pacific Islander, and 3% were other/unknown. In addition, 30% were in their first year of college, 25% were first-generation students, and 15% were female.

Measures. The key independent variable indicated random assignment into the treatment condition (0 = control, 1 = treatment). The two outcome variables were GPA in the Spring 2017 semester and returning to academic good standing after the Spring 2017 semester. Seven participants withdrew from all of their courses in Spring 2017 (three in the treatment condition and four in the control condition), so these students did not have valid data on the GPA outcome, and none of them returned to academic good standing. The criterion for placement on academic probation is straightforward; by definition, scoring below a 2.0 in any semester will result in probation. However, returning to academic good standing requires having not only at least a 2.0 GPA in each semester, but also a cumulative institutional GPA of at least 2.0. Thus, receiving at least a 2.0 GPA in a probationary semester does not always result in returning to good standing, because that GPA must be high enough to yield an overall GPA of at least 2.0. For example, if a student received a 1.5 GPA in the first semester and then received exactly a 2.0 GPA in the second semester, the student's overall GPA would not have reached 2.0.

Control variables for these analyses included sex (0 = male, 1 = female), race/ethnicity (0 = student of color, 1 = White/Caucasian), first-generation status (neither parent has a bachelor's degree; 0 = no, 1 = yes), and U.S. citizenship (0 = no, 1 = yes). Binary variables were also

created for transferring any credits from another college (0 = 0 credits, 1 = one or more credits) and taking any Advanced Placement courses (0 = no courses, 1 = one or more courses); these variables were dichotomized because about half of participants had values of zero on each measure. Students' high school GPA and ACT composite scores were available for most, but not all, participants. Therefore, to avoid problems with analyzing incomplete data, we used perhaps an even stronger indicator of prior academic achievement: cumulative college GPA in the semester(s) before probationary placement. This control variable was only modestly correlated with the Spring 2017 GPA outcome (r = .26).

Procedure. Participants received an email from the associate dean of the College of Engineering that notified them of their probationary status and provided information about how to return to academic good standing and available student resources. In addition to this information, students were randomly assigned to the treatment condition, which consisted of additional email information requesting that they complete a performance improvement plan and meet with an academic advisor (n = 55), whereas students in the control condition received no such request (n = 58). Students in the treatment condition received the following additional text in their probation notification email:

> "To help you reflect upon the reasons for your past performance and develop a plan for success, you are required to meet with [*advisor name*] to complete your individual Performance Improvement Plan, which is available at [*website*]. In this plan, you will identify the factors that have limited your performance in the past, and you will articulate a specific plan to overcome these obstacles in the future. Please call [*phone number*] to arrange an appointment with [*advisor name*], and she can answer any questions you have about the implications of being on academic probation."

Although the advising meeting was framed as mandatory, not all students scheduled and attended an appointment (it is possible, albeit unlikely, that some of these students completed the performance improvement plan worksheet without attending a meeting). Sixty-seven percent of students in the treatment condition (37 out of 55) attended this advising meeting. In addition, one student in the control condition requested to have a meeting; as an ethical consideration (and consistent with institutional review board approval), this student was allowed to complete the performance improvement plan and meet with the advisor. The meetings generally occurred in the first two weeks of classes in the Spring 2017 semester.

Analyses. Ordinary least squares multiple regression analyses were conducted to predict Spring 2017 GPA, and logistic regression analyses were conducted to predict returning to academic good standing after Spring 2017. Two models were examined; the first contained no control variables, whereas the second contained all control variables (sex, race/ethnicity, first-generation status, U.S. citizenship, transferred credits, took AP coursework, and prior college GPA). Variance inflation factors (VIFs) were below 1.3 for all variables, so multicollinearity was not a concern. The control variables were important to include in these analyses, because the randomization did not entirely succeed in creating groups that were equivalent on all observed variables. Students in the control condition had significantly higher prior cumulative GPAs (M = 2.23, SD = .44) than those in the treatment condition (M = 2.00, SD = .47), $t(111) = 2.70$, $p < .01$. However, no significant differences were observed for any other covariate as well as high school GPA and ACT composite score (which were not modeled in the regression analyses), ps > .26. Although it is clearly less than ideal that the two randomly assigned groups differed on an observed covariate, the fact that students in the control condition had a higher GPA made it less likely that the intervention would obtain the expected results.

Because Study 1 found positive effects for second- and third-year students but not for first-year students, subgroup analyses separately examined students who were in their second year or higher (n = 79) and students in their first year (n = 34). Models with no control variables and full control variables were also examined. The VIFs were below 1.5 for these analyses, so multicollinearity was once again not a concern. All students were included in the full sample and subgroup analyses regardless of whether they actually participated in a meeting or not; therefore, the results described here indicate an intent to treat rather than the effect of actual participation in the treatment.

Preliminary instrumental variable (IV) analyses were conducted to explore the effect of participating in the performance improvement plan by using the random assignment to experimental conditions as the instrument and completing a performance improvement plan as the causal variable of interest. Given the high compliance rate among students in the treatment condition, the effect sizes from the IV analyses were only modestly larger than those in the regression analyses, and the patterns of significant results were the same as those reported here.[2] In some ways, the regression results may also be more useful for practice, since institutions likely cannot force all students to complete a performance improvement plan.

Results and Discussion

The results for analyses of the entire sample are provided in Table 2. Regardless of the inclusion of control variables, being assigned to complete a performance improvement plan did not significantly predict GPA in the next semester or returning to academic good standing, *p*s > .18. However, the results differed when limiting the sample to students who are beyond their first year. As shown in Table 3, students who were asked to complete a performance improvement plan received significantly greater semester GPAs than those who were not. In analyses with and

without control variables, this difference was nearly half of a grade point (*B*s ≈ .45), which is between the Study 1 estimates for Semesters 3 and 4 (1/4 to 1/3 of a grade point) and Semester 5 (around 2/3 of a grade point). Supplemental analyses examined whether this treatment condition effect was moderated by any of the covariates (using separate analyses to examine the interaction with each covariate), but no significant interactions were observed, *p*s > .14. As expected, no significant results were obtained within subgroup analyses that examined first-year students, *p*s > .25.

The proportion of non-first-year students returning to good standing was 67% in the treatment condition and 50% in the control condition, but the logistic regression analyses did not identify a significant effect of condition within this small analytic sample. However, an indirect effect that operates through semester GPA seemed likely, since returning to academic good standing is determined by GPA in the probationary semester (although the exact semester GPA needed to achieve a 2.0 cumulative GPA varied across students). Therefore, bootstrap mediation analyses with 5,000 resamples and bias-corrected and accelerated confidence intervals were conducted using the Process 2.16 macro, which appropriately treated the good academic standing outcome as binary (see Hayes, 2013; Preacher & Hayes, 2004). No control variables were used in this analysis, because none of the control variables was significant in the regression analyses. As shown in Table 4, the indirect effect of treatment condition was significant, as indicated by the 95% confidence interval that does not include zero. Thus, the request to complete a performance improvement plan promoted academic good standing indirectly by improving GPA in the probationary semester.

An apparent reason that the intent to treat significantly predicted GPA only among non-first-year students was that these advanced students were more likely than first-year students to

complete the performance improvement plan when requested to do so. Among participants in the treatment condition, 79% of non-first-year students attended a meeting versus only 50% of first-year students, which was a statistically significant difference, $\chi^2(1) = 4.97$, $p < .03$. Not surprisingly, students who completed the performance improvement plan fared notably better than those who did not; this pattern holds regardless of whether examining all students or just those who received a request to complete this plan (see Table 5). Self-selection into completing the performance improvement plan likely played a role in these disparities, but it seems likely that assignment to the treatment condition would only yield benefits to students who participated in the actual treatment.

General Discussion

The findings of the experimental and regression discontinuity studies consistently support the same overall conclusion: The goal-setting advising intervention promoted academic achievement for students who are beyond their first year, but not for students in their first year. Why might these differential effects have occurred? As one possibility, colleges and universities often provide substantial support to first-year students through orientation, first-year seminars, supplemental instruction, mentoring programs, academic advising, "early alert" systems, and other approaches (e.g., Padgett & Keup, 2011; Upcraft, Gardner, Barefoot, & Associates, 2005). In contrast, students in their second and third years often receive substantially less support (Gahagan & Hunter, 2006; Tobolowsky, 2008), so an advising-based intervention may provide an important structure and outreach that would otherwise be absent for these students. The performance improvement plan required students to consider barriers to success in the previous semester and strategies for enhancing their academic performance, thereby providing a motivational and strategic framework to achieve their academic goals in the future. However,

this structure may be less important for first-year students who receive many other forms of support, especially when they are facing difficulties.

As another possibility, academic struggles that occur early in an engineering major may have different causes and consequences than those that occur later. For instance, some first-year students who intend to be an engineer may not have received adequate academic preparation for this degree program. Although the performance improvement plan might provide these students with some helpful considerations, the challenges of having insufficient precollege training in math and science coursework may be too substantial to overcome, especially within introductory courses that may be especially difficult. Most of these underprepared students will likely have transferred to another major or have left the institution by their second year, so the students who remain within the engineering major may be in a better position to benefit from the performance improvement plan. In addition, students may react to their probationary placement in their first semester or two differently than later in college. Students who have been reasonably successful in their first year may be more likely to believe that placement on academic probation does not reflect a lack of ability to succeed in their major or in an engineering career. However, academic struggle in the first year could be more discouraging, since students do not have as much evidence that they can be successful in college. As noted above, first-year students in the experimental condition were far less likely to comply and participate in the treatment than were non-first-year students, which suggests that first-year students may feel that the plan is less likely to be helpful and/or they are already disengaging from their pursuit of an engineering degree.

These two studies were designed to test the overall impact of an advisor-based goal-setting intervention rather than to examine how the specific attributes of this approach might operate individually to affect academic achievement. That said, it is worth considering how the

features of this approach may have been influential. Goal-setting theory informed the performance improvement plan, and as such, it may be that the process of students' establishing academic goals was an important feature of this intervention. The performance improvement plan was structured to facilitate students' establishing specific and relevant goals for the upcoming academic semester. Research has demonstrated that goal specificity is associated with greater goal attainment and performance (Mento et al., 1987), so this targeted approach may have proven fruitful. The performance improvement plan also allows students to play an active role in their academic goal-setting, which is another important feature of goal-setting that contributes to greater performance (McShane & Von Glinow, 2005).

It is worth noting that an advisor facilitated this intervention rather students' setting their goals independently. Although students completed the performance improvement plan worksheet prior to meeting with the advisor, an advisor meeting was required as part of the plan. These one-time advising meetings could be described as "intrusive" in nature, as students reviewed their previous academic performance and collaboratively established academic goals for the future with the advisor. Moreover, the goal-setting activities and advisor meeting implicitly convey a growth mindset, such that students' academic performance and success is viewed as being within their control rather than as a product of fixed, immutable characteristics (see Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Dweck, 2006). Consistent with the goals of this intervention, emerging evidence indicates that merely crafting the letter that informs students about their probationary placement in a more psychologically attuned manner (by framing academic probation as a process that many students experience through which learning and growth may occur) can promote students' help-seeking behaviors and intent to persist (Brady et al., 2019; College Transition Collaborative, 2018).

Perhaps the main limitation of this work pertains to the generalizability of the findings. Specifically, the intervention was conducted at one public research university, so the findings might not generalize beyond this setting and population of engineering students on academic probation. That said, this intervention is theory driven, and there is no obvious reason that this intervention cannot be generalized to other STEM fields and perhaps majors outside of STEM. Of course, STEM majors are not monolithic; for instance, substantial differences exist across STEM majors in the representation and climate for women and for students with other minoritized identities (Cheryan, Ziegler, Montoya, & Jiang, 2017). However, the performance improvement plan and corresponding in-person meeting generally focuses on factors pertaining to academic success that are within students' control, so the departmental milieu may be less relevant to the efficacy of this approach. Indeed, neither study found that these intervention effects varied as a function of student demographics (other than year in school), which provides further support for the potential generality across contexts. Engineering majors at this university also take the vast majority of their early coursework with other STEM majors in classes that are taught in other departments (e.g., mathematics, chemistry, physics), so the factors that affect academic success are probably similar across STEM majors.

As another issue pertaining to generalizability, a single academic advisor conducted the intervention for all participants, and therefore the results could be a function of the unique skills and characteristics of the advisor as opposed to the intervention in general. In other ways, this specific limitation also represents a strength of the study, since the intervention was delivered in a consistent manner across all students. Finally, each of the two studies had a different limitation: Study 1 could not disentangle the effect of being placed on probation from the intervention, while Study 2 contained a fairly small sample size. Both studies were included in the same paper

to rule out alternative explanations for the findings from the other study. Specifically, the significant effects in Study 1 could be simply attributed to probationary placement if not for the significant experimental results of Study 2, and the differential effects by first-year status in Study 2 could be attributed to random chance if not for the same pattern of results by year in Study 1.

Conclusion and Implications

Although the present findings are promising, future research should explore the generalizability of this advising approach across advisors, majors, and institutions. Moreover, since this intervention consists of two parts, future research should attempt to disentangle the effects of the self-directed performance improvement plan worksheet and the advising meeting. It may be that completing the worksheet is effective regardless of meeting with an academic advisor and vice versa. Future research should also conduct semantic analyses of students' responses to the performance improvement plan's written prompts in order to understand important reflective and goal-setting processes that might enhance the effectiveness of this and other interventions for students on academic probation.

These results lead to several implications. Given the fairly large effect size and the brevity of the intervention, this academic enhancement strategy may represent a cost-effective and efficient method for promoting academic success with students on academic probation. As a result, institutions of higher education should consider implementing similar advisor-based goal-setting interventions to promote academic success and enhance the academic performance of STEM students on academic probation. In addition, academic advisors, college counselors, and other student services personnel are all in a unique position to assist students on academic probation. It is not uncommon for students with academic difficulties to seek help through

multiple programs, services, and individuals. Advisors and other student service personnel should utilize goal-setting interventions to assist students on academic probation return to good academic standing. Similar to the intervention in this study, these efforts should prompt students to reflect on barriers to previous academic success and identify goals and strategies for academic success in the future. Advisors who are better able to collaboratively establish goals and tasks for achieving academic success, and who establish a positive working relationship with students, may prove more effective at assisting students in returning to good academic standing. Helping students establish clear goals may enhance their commitment to action and ultimately lead to academic success, which in turn could further strengthen their goals and self-efficacy.

The present results may also inform broader considerations for the allocation of institutional efforts and resources to help students progress toward a degree. A great deal of attention—in terms of both practice and research—has been paid to helping students adjust and succeed in their first year of college (e.g., Feldman, 2018; Upcraft et al., 2005). However, strategies for promoting college success that focus on students beyond the first year have received less consideration. This study provides evidence that a brief advisor-based goal-setting intervention is effective at assisting engineering students on academic probation after the first year of college. As a result, colleges and universities may rely on existing supports for first-year students, while choosing to target the present types of advising-based efforts toward students who have progressed further in their undergraduate studies.

Notes

[1] The process of initial placement into academic probation is straightforward, since this occurs immediately after—and only when—a student receives a semester GPA below 2.0. However, as described later in the paper, returning to academic good standing is more complicated; it requires the student to achieve not only at least a 2.0 GPA in that probationary semester, but also at least a 2.0 cumulative GPA within the institution. Students who do not successfully return to academic good standing at the end of the semester are dismissed from the College of Engineering (some of these students ultimately transfer to another college within the university). Importantly, the present study limited the analytic sample of each RD analysis to students who were enrolled in engineering during the semester in which they were on probation, which ensured that a sharp RD design is appropriate. For instance, the RD analyses that used Semester 3 GPA as the running variable only included students who were enrolled in an engineering major in Semester 4. This sampling is important not only because the performance improvement plan would have occurred for engineering students at the beginning of Semester 4, but also because students who were on probation in Semester 2 and did not return to good standing after Semester 3 would be excluded; thus, the analysis meets the definition of a sharp RD design. The sharp design pertains to being placed on probation and therefore receiving a request to participate in a performance improvement plan. Not all students actually completed this plan, and the available registrar data in Study 1 did not allow us to differentiate treatment completers from non-completers.

[2] The results of the instrumental variable analyses are available upon request from the lead author.

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Table 1. Results of regression discontinuity analyses for falling above or below the probationary GPA cutoff in one semester predicting college GPA in the next semester.

				Total Sample Size		Effective Sample Size	
Term GPA Used as Running Variable	*B*	*SE*	*p*	Left of cutoff	Right of cutoff	Left of cutoff	Right of cutoff
Analyses with no Covariates							
Semester 1	-.118	.198	.552	157	2770	79	805
Semester 2	.009	.178	.960	204	2150	107	575
Semester 3	.259	.146	.076	222	1823	75	343
Semester 4	.327	.147	.026	109	1694	79	566
Semester 5	.667	.304	.028	118	1465	23	472
Analyses with Covariates							
Semester 1	-.057	.221	.797	159	2765	68	537
Semester 2	.101	.172	.557	204	2146	114	535
Semester 3	.316	.152	.037	222	1819	75	293
Semester 4	.341	.183	.062	109	1690	51	578
Semester 5	.606	.303	.045	117	1462	22	366

Note. Analyses were conducted using an MSE-optimal bandwidth selector and local linear regression. Bias-corrected values are provided. Regression coefficients are reversed so that positive values reflect a positive effect of falling below the GPA cutoff of 2.0. Covariates were race/ethnicity and sex. Total sample size indicates the number of participants who had valid data for that analysis, whereas effective sample size indicates the number of participants who were included in the regression discontinuity analysis (i.e., they were within the RD bandwidth).

Table 2. Unstandardized coefficients for multiple regression analyses examining experimental assignment to complete a performance improvement plan as a predictor of semester GPA and returning to academic good standing in the next semester (all students).

	GPA in Next Semester		Academic Good Standing	
Predictor	Model 1	Model 2	Model 1	Model 2
Assigned to treatment	.156	.251	.033	.540
	(.160)	(.163)	(.377)	(.453)
Female		-.010		-.404
		(.218)		(.609)
White/Caucasian		-.173		-.757
		(.186)		(.532)
First-generation student		-.176		-.134
		(.185)		(.505)
U.S. citizen		-.015		-.998
		(.295)		(.947)
Transferred college credits		.370*		.433
		(.173)		(.473)
Took AP coursework		-.020		-.952*
		(.163)		(.453)
Prior college GPA		.405*		2.010***
		(.178)		(.575)
R^2 (or pseudo-R^2)	.009	.146	.000	.172

Note. Standard errors are in parentheses. Logistic regression analyses were used to predict the binary outcome of returning to academic good standing.
*$p < .05$ **$p < .01$ ***$p < .001$

Table 3. Unstandardized coefficients for multiple regression analyses examining experimental assignment to complete a performance improvement plan as a predictor of semester GPA and returning to academic good standing in the next semester (excluding first-year students).

	GPA in Next Semester		Academic Good Standing	
Predictor	Model 1	Model 2	Model 1	Model 2
Assigned to treatment	.437*	.465*	.693	.730
	(.187)	(.194)	(.473)	(.521)
Female		-.162		-.721
		(.245)		(.695)
White/Caucasian		-.392		-1.048
		(.233)		(.650)
First-generation student		-.178		-.537
		(.226)		(.590)
U.S. citizen		.333		-.650
		(.360)		(1.233)
Transferred college credits		.411		.588
		(.210)		(.549)
Took AP coursework		.135		-.358
		(.203)		(.532)
Prior college GPA		.350		1.418
		(.297)		(.868)
R^2 (or pseudo-R^2)	.072	.176	.020	.111

Note. Standard errors are in parentheses. Logistic regression analyses were used to predict the binary outcome of returning to academic good standing.
*$p < .05$ **$p < .01$ ***$p < .001$

Table 4. Results for mediation analyses examining the indirect effect of treatment condition on academic good standing via semester GPA among non-first-year students.

Dependent variable (DV)	Effect of treatment condition on DV: w/out mediator (*c*-path)	Effect of treatment condition on DV: w/mediator (*c'*-path)	Effect of treatment condition on GPA (*a*-path)	Effect of GPA on good standing (*b*-path)	Bootstrap point estimate of indirect effect	95% bootstrap confidence interval for point estimate	Nagelgerke pseudo-R square for DV model
Academic good standing	.821 (.516)	.198 (.828)	.437* (.187)	5.474*** (1.404)	2.390	[.239, 11.461]	.728***

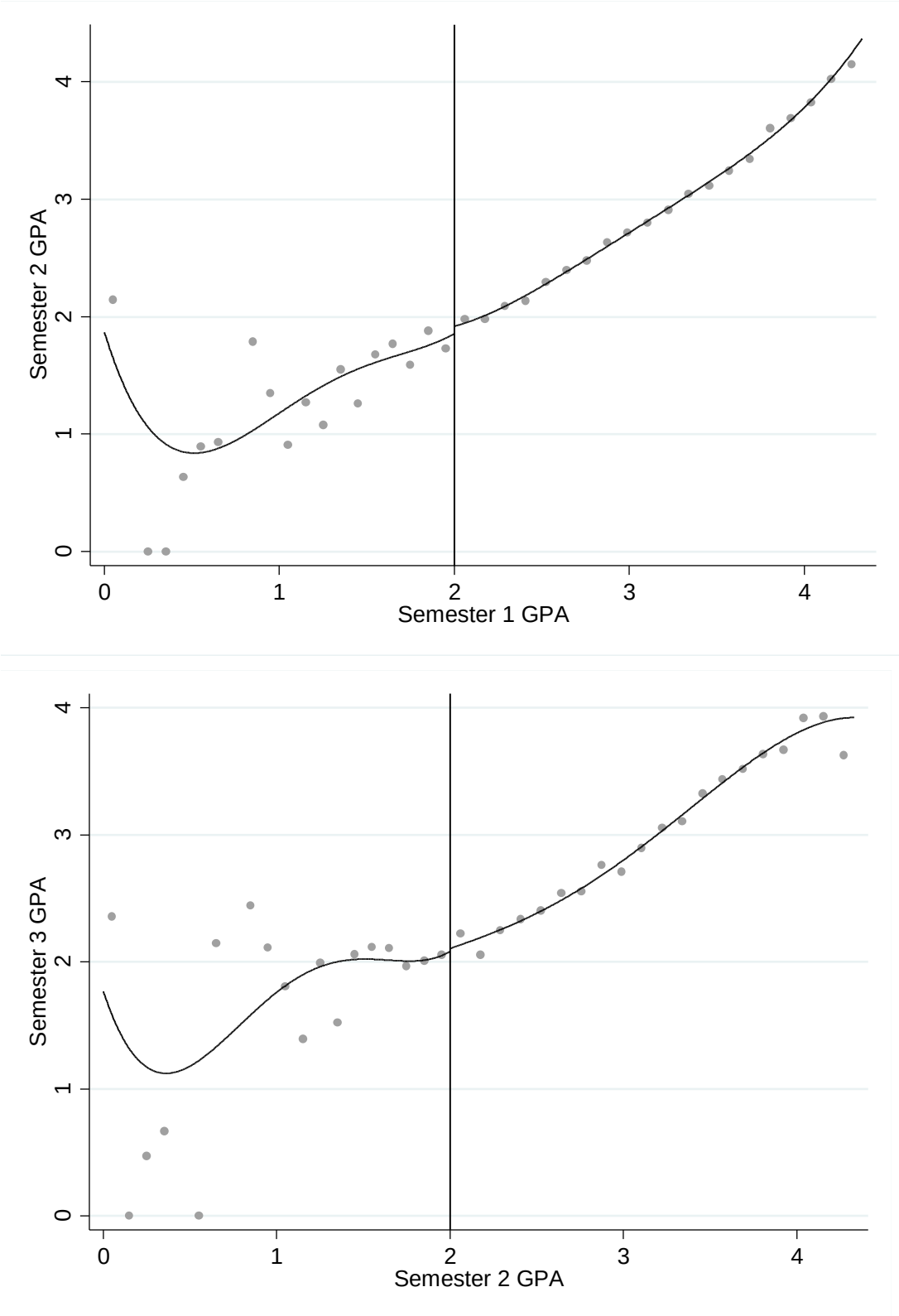
Note. The academic good standing outcome was modeled as binary using logistic regression. Bootstrap estimates of indirect effects were based on 5,000 resamples. Significance testing is not conducted on the bootstrap point estimate; instead, a significant effect is indicated via a 95% confidence interval that does not include zero. Bias corrected and accelerated confidence intervals are listed in brackets. Standard errors are listed in parentheses.

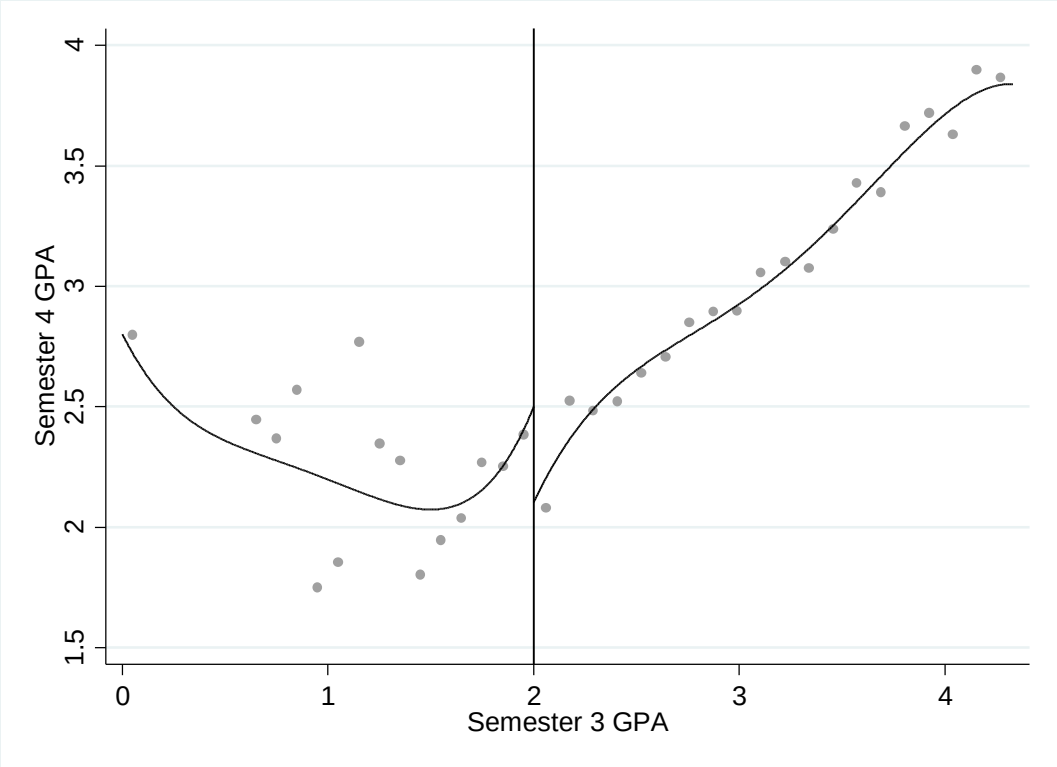
Table 5. Differences between students who completed and did not complete a performance improvement plan (PIP).

	All Participants			Participants in the Experimental Condition		
Outcome	PIP	No PIP	*p*	PIP	No PIP	*p*
GPA in next semester	2.31 (.77)	1.86 (.81)	.007	2.29 (.77)	1.66 (.61)	.006
Academic good standing	.63	.41	.028	.62	.22	.005

Note. Standard deviations are in parentheses. T-tests were conducted for semester GPA; chi-square tests were conducted for returning to academic good standing (the proportions of those who did so successfully are provided above). One student in the control condition completed a PIP, which explains why the PIP values among all participants differ slightly from those in the experimental condition.

Figure 1. Relationships between GPA in one semester and GPA in the subsequent semester for students above and below the academic probationary cutoff.

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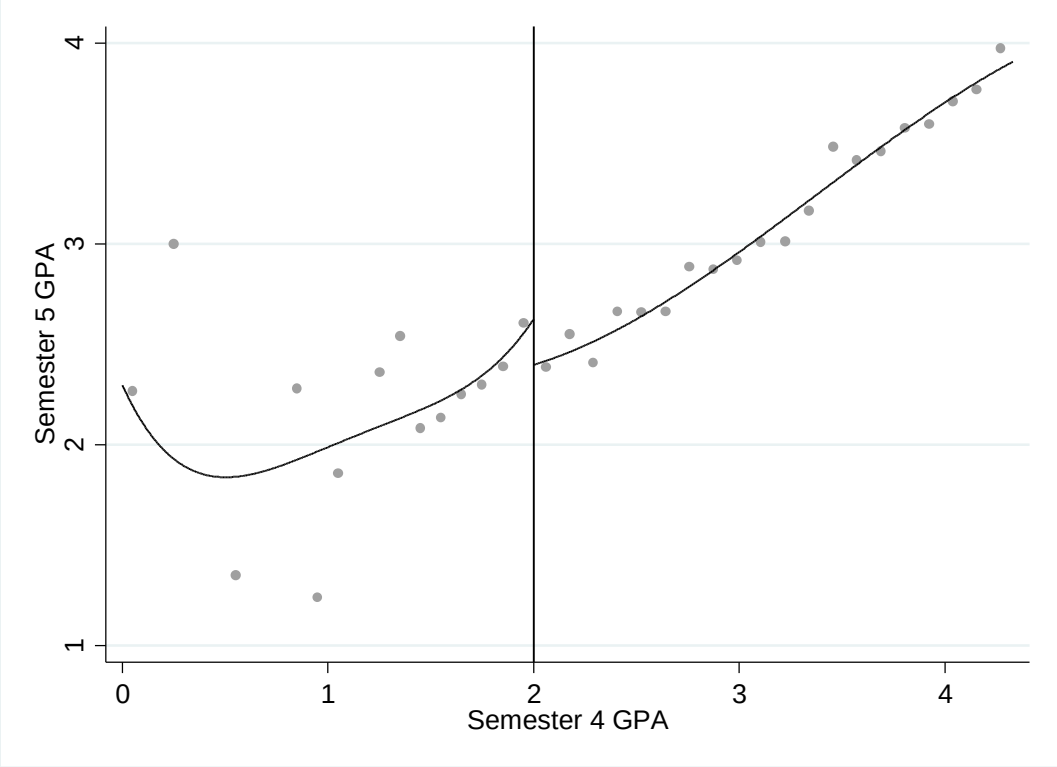
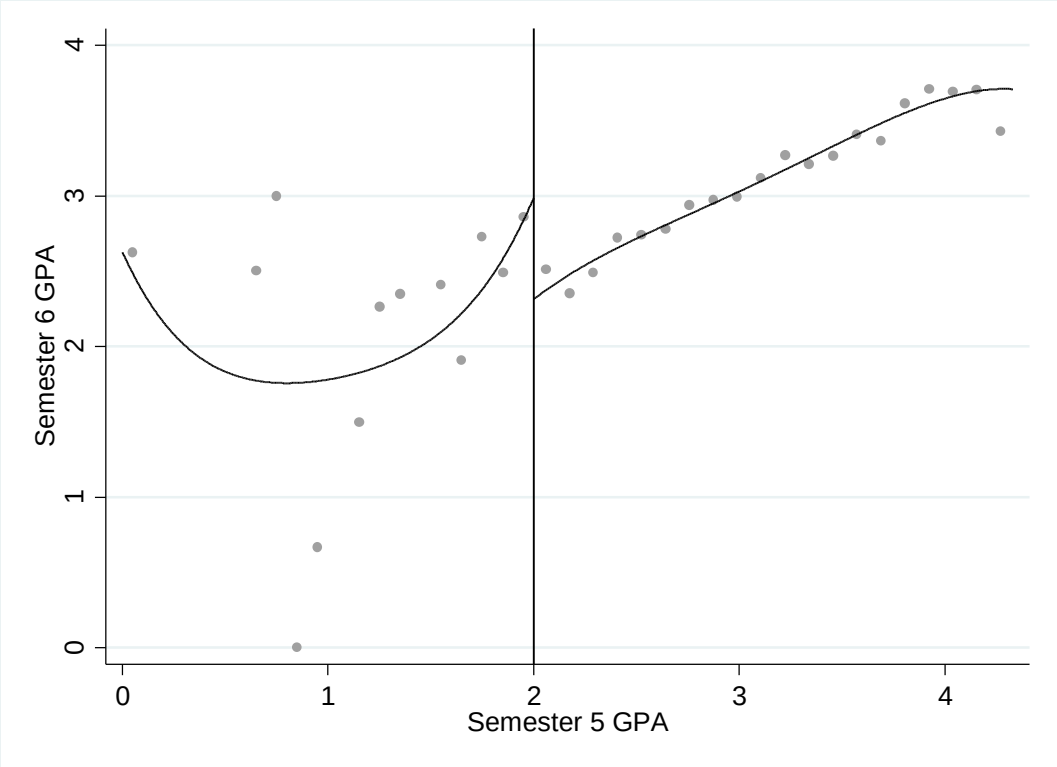
2
2.5
3
3.5
4
0
1
2
3
4
Semester 3 GPA


Semester 5 GPA
1
2
3
4
0
1
2
3
4
Semester 4 GPA


Semester 6 GPA
0
1
2
3
4
Semester 5 GPA
0
1
2
3
4

Appendix. Descriptive statistics for all variables in both studies.

Study 1			Study 2		
Variable	*M*	*SD*	Variable	*M*	*SD*
Female	.24	.43	Female	.15	.36
Student of color	.23	.42	Student of color	.40	.49
First-generation student	.20	.40	First-generation student	.25	.43
High school GPA	3.78	.41	U.S. citizen	.91	.29
Semester 1 college GPA	3.00	.72	Transfer student	.50	.50
Semester 2 college GPA	2.81	.79	Took AP courses	.46	.50
Semester 3 college GPA	2.81	.93	First year in college	.30	.46
Semester 4 college GPA	2.94	.77	Prior college GPA	2.12	.47
Semester 5 college GPA	3.02	.90	Treatment condition	.49	.50
Semester 6 college GPA	3.12	.83	Spring 2017 college GPA	2.02	.82
			Academic good standing	.49	.50