A Mixed-methods Exploration of the Outcomes of the Research-Aligned Mentorship program at Farmingdale State College

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RUNNING HEAD: FSC RAM Program Outcomes

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Increasing 4-year graduation rates among US students, particularly those historically disadvantaged in higher education, is a national imperative. Using student data (N=1,462) from a federally-funded project, this paper examines the impacts of the Research Aligned Mentorship (RAM) Program on whether students are on track to graduate within four years. Qualitative and quantitative data and analytic approaches are integrated to explore significant outcomes, including year-to-year retention, annual grade-point average, annual credits earned, and whether students succeed in graduating at the end of four academic years. The RAM Program provides such interventions as a first-year experience seminar, collaborative learning workshops, intensive counseling, and mentored research experiences. Randomly-selecting treatment and control groups among low-income, first- generation, and minority students, the College achieved its key goal of a 20 percentage-point increase in the four-year graduation rate and achieved comparable gains in retention, GPA, and annual credits earned among students in the treatment group. Data show that active engagement, whether measured through participation in RAM interventions or by RAM staff perception, is positively and significantly associated with students having higher GPAs, annual credits earned, persistence from year-to-year, and 4-year graduation.

Keywords: Undergraduate research, mentorship, student persistence, 4-year graduation, URM students, first generation college

Introduction

At its best, undergraduate education is transformative (Kahn, 2002; Scott, 2013). Through a variety of experiences that stretch from first year through senior year and occur both inside and outside the classroom, a qualitative change takes place. Such education broadens students' perspectives, opens their eyes to new opportunities, and prompts serious reflection about self, values, and community (Pascarella & Terenzini, 2016). The transformative Research Aligned Mentorship (RAM) Program, assessed in this study, was established through a five-year FIPSE First in the World (FITW) grant awarded to Farmingdale State College (FSC) in 2015. The RAM program was intended to increase college success, as defined by completion of a 4-year degree within 4 years, as well as by milestone proxies (such as annual credits earned and year-to-year retention), among so-called "high needs" students who are frequently failed by mainstream higher education. A distinguishing feature of the methodology was the use of random-selection in choosing students for the RAM Program and a control group with matching characteristics.

The purpose of this paper is to describe the RAM program: its underlying conceptual/theoretical framework, the components of the program, associated relevant

literature, the distinctive research methodology that was employed, the research findings, and the overall significance of this study. The research questions guiding this study are:

1. What is the impact, both observed and perceived, of participation in the RAM program on annual retention, annual credits earned, GPA, and four-year graduation rate, as compared to non- participating students, controlling for student characteristics and prior academic achievement?
2. Do impacts vary by level of participation, whether observed or perceived?
3. Does participation in RAM activities increase student perceptions of sense of belonging in college or likelihood of pursuing research in careers or post-graduate study?

The RAM Program

Farmingdale State College (FSC) SUNY is a moderately selective four-year baccalaureate teaching institution that enrolls 10,000 students in its four schools of Arts and Sciences, Engineering Technology, Health Sciences, and Business. A disproportionate number of FSC students are "high need" (44% ethnic/racial minority, 59% low income, 44% first-generation college); 96% are commuter students who juggle family responsibilities and outside employment while pursuing a college degree. Aware of the multiple challenges and difficulties that beset high-need students and thwart their ability to graduate in four years, FSC sought to identify an effective model for success among high-need students: UCLA's Program for Excellence in Education and Research in the Sciences (PEERS). In a 2015 study examining 12 years of the PEERS Program, Brit Toven-Lindsey and colleagues demonstrated that PEERS interventions significantly improved the academic success of underrepresented minority students (Toven-Lindsey et al., 2015). Seven key interventions of PEERS are presented on the current website (Semel Institute for Neuroscience and Human Behavior, 2020). They are: (1) Pathways in Science seminars; (2) Collaborate learning workshops; (3) Career planning; (4) Research talks by UCLA faculty; (5) Social events; (6) Preparation for undergraduate research; and, (7) Research scholarships.

While impressed with the PEERS example, FSC also recognized that there are differences between FSC and UCLA, as well as limitations to the PEERS model, that would need to be addressed:

First, there are significant differences in the academic records and rates of persistence of students entering FSC in comparison to UCLA students (Table 1, Appendix 1).

Second, given the UCLA students' stronger records of prior academic achievement and graduation rates, the PEERS Program is a two-year program focused on launching high-need students well. FSC – with significantly lower 4-year and 6-year graduation rates - determined that its students would benefit from a carefully orchestrated four-year program designed both

to launch students in the first two years and then continue to provide guidance throughout a student's college career.

Third, PEERS students are drawn exclusively from those who major in the STEM fields minus Engineering. FSC wanted to cast its net broadly, serving students who pursue any of FSC's 42 baccalaureate majors offered by its four schools.

Fourth, while UCLA recognizes the importance of offering workshops and tutoring in support of a student's studies, FSC deemed it important to integrate both considerable academic and supplemental support components into its program.

Fifth, while both UCLA and FSC see the benefit of having students engage in mentored research, PEERS does not actually match or place its students in research. Instead, given the resources of UCLA as a doctoral research university with 3,661 F/T faculty and 1,157 research staff, on-campus research opportunities are plentiful and PEERS students apply on their own for such positions. As a teaching institution with only 247 F/T faculty, FSC knew that if RAM students were to have research opportunities, the program staff would need to compensate for the fact that FSC lacks significant grant- funded researchers and major research labs. FSC would need to identify research opportunities both on campus and at other institutions, publicize those opportunities proactively, and then match RAM students with research placements and mentors. FSC also recognized that, given the heavy teaching commitment of its faculty, there would be a need for a financial incentive, support, and professional development so that FSC faculty might effectively mentor students in their research.

Sixth, while UCLA students apply to participate in the PEERS program (submitting grades, Math SAT scores, and two essays), FSC sought to design a rigorous research study by employing a random control methodology that would see the annual selection of 400 entering high-need, first-year students (approximately 220 treatment and 180 control) by applying an algorithm to the database of all entering high-need students. Such anonymous random selection yields a cohort of treatment students representing a wide range of academic majors and varying records of prior academic achievement. While UCLA begins with high-achieving students and many colleges create special programs for honors students, FSC wished to pioneer a way to change the lives of all students.

Conceptual Framework

Inspired by PEERS, but also mindful of the differences between UCLA and FSC and in recognition of the limitations of the PEERS model, FSC created its Research Aligned Mentorship (RAM) Program using the following dynamic model (Figure 1). This conceptual framework depicts factors, relationships, and treatments that are designed to promote persistence, academic success, and four-year graduation rates among high-need students (e.g., low income, ethnic and racial minorities, and/or first-generation college students).

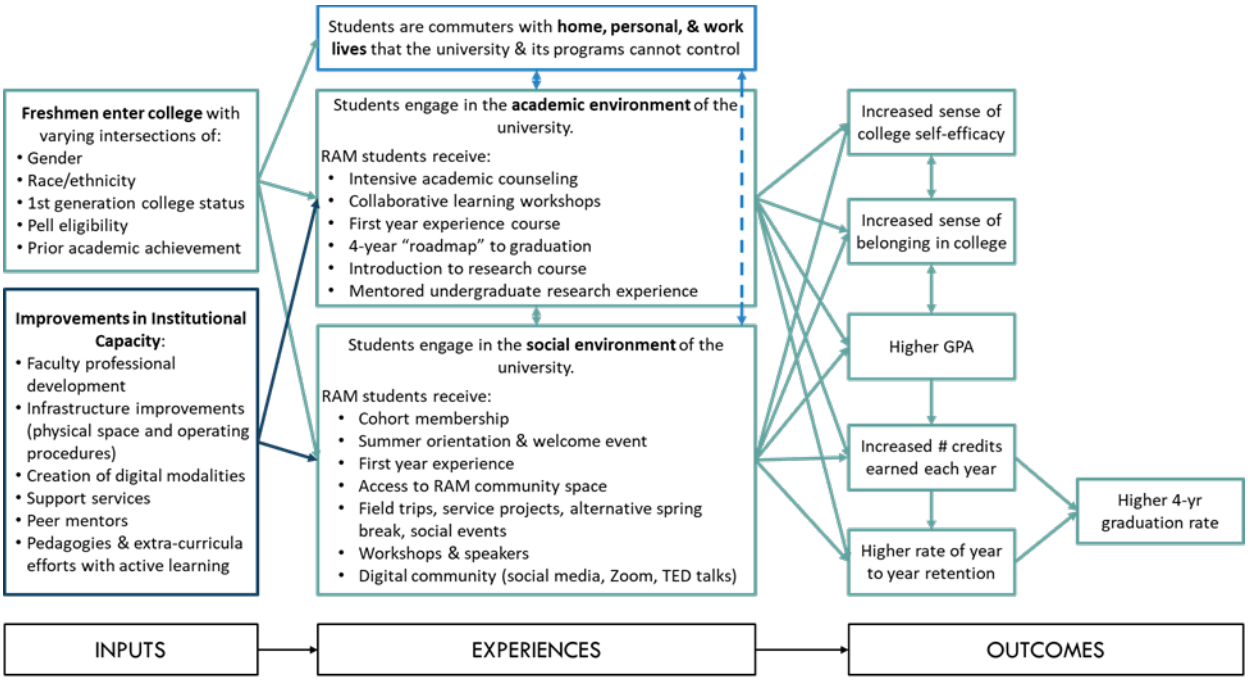

Figure 1. Conceptual Framework for FSC RAM

The FSC RAM conceptual framework begins by including the statistically confirmed and validated variables found in early models of student dropout (Bean, 1982; Tinto, 1975, 1987). Those variables are student goals and intentions, the student's institutional experience of the academic system and the social system, and resulting academic and social integration. The RAM model then builds on these studies by incorporating a great deal of additional material that predicts student persistence and academic success:

1. Astin's (1984) student involvement theory in which the amount of student engagement in college (in both the academic environment and the social environment) is positively related to the amount of learning and personal development.
2. Pascarella's (1980) insight that, with regard to student-faculty interaction, the most positive influence comes from "interactions that extend the intellectual content of the study program into informal non-classroom contexts" (Aljohani, 2016, p.9).
3. Insights on the importance of the first-year experience (e.g., Upcraft et al., 2015) .
4. Institutional capacity-building can have a positive effect on student persistence through professional development of faculty and staff, the improvement of infrastructure (both physical
5. and operating procedures/rules), the creation of digital communication modalities, and strengthening student support services.
6. AAC&U findings about the connections between student success and high impact practices (e.g., learning communities, service learning, research with faculty, internship or field experience, project-based or active student-centered pedagogies, study abroad, and culminating senior experience).

7. More recent literature on the psycho-social needs of first-generation college students, low- income students, underrepresented minorities, and women in male-dominated fields, as well as related non-cognitive predictors of student success.
8. Finally, most studies of undergraduate student retention examine attrition at 4-year residential institutions. FSC does not fit that traditional model, as 96% of FSC students are commuters who remain attached to their families and have home and work responsibilities. Accordingly, the RAM program puts a premium on learning how to engage commuter students and forge new bonds that create a vibrant on-campus family or, as it is called at Farmingdale, "RAMily."

Key Interventions/Components of FSC's RAM Program

First-Year Programming

Successful transition from high school to college is vital for student persistence and success. The RAM Program strives to assure that its students not only adjust well to college, but also acquire a powerful identity as RAM Scholars and members of the "RAMily." That effort begins in the spring with a congratulatory letter and glossy acceptance packet sent by the RAM Director to the 200+ entering students each year who are randomly selected for the program. Because they do not apply to participate in the program, because there is no scholarship awarded to participants, and because RAM Scholars will take on additional coursework and hands-on research, it is essential that the new students gain an early appreciation for the program, understand the importance of graduating in four years, and become enthusiastic about being RAM Scholars. They (and parents/guardians) personally visit the RAM offices in the summer to meet the Director and staff and to have individual advisement appointments with their first-year RAM Counselor. The new students attend a two-day RAM summer "Kick-Off" in which they meet the RAM staff, fellow members of their cohort, and upper-class RAM Scholars who will serve as their peer leaders throughout their first year. This mini-orientation – with information about college resources and break-out sessions featuring games and community-building – is effective in overcoming anxiety and in building RAM identity. Communication with peer leaders continues via social media over the summer. Then, an official "Welcome Event" for all new RAM Scholars and their family members is held during the first week of the semester. The College President congratulates the students and their parents, the Director and staff give brief introductions, current RAM Scholars speak about their research experiences and other RAM activities, and key faculty mentors are profiled. The program concludes with an official induction ceremony and reception. These three early events solidify the new RAM cohort. Annually, no more than 4 of the 200+ students elect not to participate in the RAM Program.

Once the fall semester begins, all new RAM Scholars take RAM 101 (First Year Seminar) that is facilitated by their RAM counselors. Meeting weekly in small classes of 12-20 students, this 1-credit course features group work, active listening, and class discussions that prepare students to navigate college. They are guided through opportunities to reflect about themselves, each other, their academic pathway, and their career and personal goals. They journal weekly in a

"Digital Roadmap to Graduation and Beyond" and view and discuss TED talks such as Angela Duckworth's "GRIT" (2013), Daniel Goldstein on "The Battle Between your Present and Future Self" (2011), and Sheryl Sandberg on "Women Leaders" (2010). This weekly collaborative gathering builds support and friendship among students and bonds them with their counselor.

Finally, all first-year students are encouraged to join in social and co-curricular programs offered to all RAM Scholars throughout the year. These include holiday parties, ethnic celebrations, community service, roller skating, and assorted speakers on topics such a Big Data, Health Disparities in NYC, and Biomedical Research at NYU.

Intensive Counselling Over Four Years

Given the goal of seeing RAM Scholars graduate in four years and the current weak graduation rates at FSC (4 yr: 31% and 6 yr: 53%), the RAM program instituted an intensive-type of counseling that includes much more than academic advisement. While students are expected to see their department chair or a faculty advisor in their major once each semester, they are also required to meet with their RAM Counselor at least two times each semester during years 1 and 2 and at least once per semester during years 3 and 4. This program is successful in guiding and motivating students, helping students navigate the complexities of higher education and address the weak sense of belonging and lower self-efficacy that is often associated with high-need students. They are guided along the Digital Roadmap's path of self-reflection and engage in short- and long-term planning. The bond created between the counselor and advisee in the fall is strong as students are assigned a counselor according to their major, and that counselor teaches the advisee weekly in the RAM 101 seminar. As a result, first-year students actually have one-on-one appointments with their RAM counselor not the 2 times that are required, but on average 6 times a semester. Once the habit of meeting with the counselor has been established during the first year, it continues through years 2, 3, and 4.

During their second year the students transition to their new counselor, either the Director or the Assistant Director of the program. The counselors' new focus is preparing their advisees for their research experiences and helping them with post-graduation plans. Majors in STEM or health professions work with the Director (who holds a PhD in Biology) and the other students with the Assistant Director (who has a social science background and PhD in Education). In addition to meeting for advisement, the Director and Assistant Director see all of their advisees weekly during the sophomore year as they are the instructors of the 1-credit RAM 201 (Introduction to Research). As mentioned previously, having those who counsel the students also teach RAM courses serves to solidify the bonds between students and the staff who are there to help them succeed.

Academic Programming – Curricular Enhancements and Active Student-Centered Pedagogies

The RAM program is not only a support program. RAM is an academic program in which students enroll in RAM-specific courses that have been approved by the College as satisfying

major or other graduation requirements. RAM 101 (First Year Seminar) and RAM 201 (Introduction to Research) are both credit- bearing courses. Another important RAM course is RAM 102, a 1-credit Collaborative Learning Workshop facilitated by the math professors who teach RAM-only sections of statistics and pre-calculus. The collaborative learning workshop is based on the pioneering work of Uri Treisman (1992) who understood that disadvantaged students are able to prosper when collaborative workshops assist them in foundational math courses. Internal assessment shows that RAM Scholars earn grades in their companion math course that are statistically higher than those of control group students who do not benefit from RAM 102. RAM 303 is a 3-credit research experience in which a RAM Scholar engages in research with an FSC faculty mentor who determines the grade for RAM 303. Finally, beyond the specific courses that carry the RAM designation, the program also arranges for sections of engaged pedagogy courses reserved exclusively of RAM students. These courses include a small (i.e., 25 students) integrated Introduction to Biology lecture and lab for Biology majors, Learning Communities in which students enroll two courses that faculty synchronize around a common theme, and other project-based learning courses from across the curriculum. Wherever possible, RAM Counselors assure that RAM Scholars choose to register for course that employ high impact pedagogical practices.

Research Preparation and Practice

The culminating experience of the RAM Program is the placement of each RAM Scholar in a research experience on- or off-campus. This placement gives the Scholar a high-impact hands-on learning experience. Whether students participate in an NSF Research Experience for Undergraduates, apprentice in a business internship, or work side-by-side on campus with a faculty research mentor, this educational experience outside of the normal classroom enhances knowledge and provides scholars with direct exposure to real-world applications and career options. See Appendices for sample testimonials from student researchers.

The RAM Directors work diligently to secure placements by conducting one-on-one interviews with over 150 FSC faculty researchers and by building relationships with researchers at other universities and laboratories and with businesses. Each option is profiled in a database available to students.

Unlike most university programs that simply thrust students into the research setting without serious preparation or training, all RAM Scholars enroll in RAM 201 (Introduction to Research) in their sophomore year. Taught by the RAM Directors, this 1-credit course covers how to find and read research articles and how to break down the complex ideas of a research proposal. It walks students through the scientific process and issues of research ethics. All students are required to complete an IRB-compliant training in research with human subjects. They conclude the course by creating a research proposal in digital form. Ancillary workshops are offered on how to apply for NSF-REUs and other competitively funded programs.

Once a Scholar has completed RAM 201, the RAM Directors then meet with the student to select and secure the best summer or academic year placement. Because the Directors have come to know the students in RAM 201 and as advisees, they are able to take into account not only the students' academic and career interests, but also their personality and mentoring style.

Most research placements carry the RAM 303 (Research Experience, 3 cr.) designation. However, students have the option of earning 6, 9, or 12 credits depending on the hours worked. The RAM Guidebook that is shared with students, faculty mentors, and off-campus supervisors and mentors requires that the student complete a detailed agreement with the mentor, maintain a log of hours and activities, prepare weekly reflections on the learning experience, and respond to various prompts about their experience as part of mid-term and final evaluations. The research mentor also prepares evaluations and sustains ongoing communication with RAM Directors. Students are encouraged to join their research mentors in proposing to submit a poster or paper at professional conferences.

Creating the RAMily by Engaging Students in Extra-curricular and Co-curricular Activities

Because almost all RAM Scholars are commuter students who are tied to family, the RAM Program strives to nurture in its students the sense of community and engagement in college that students at residential institutions come by naturally. Not only are RAM Scholars encouraged to join FSC clubs, organizations, and student government, but the RAM staff work diligently to create family (or "RAMily") among all 800+ RAM Scholars. It begins during the summer Kick Off orientation when students play a raucous game of "RAMily Feud." It continues with speakers, social events, workshops, film nights, and parties throughout the year. An underlying theme of many RAM activities is Social Justice. To that end, two years ago "RAMdom Acts of Service" was launched where students are given monthly opportunities for community engagement and service (e.g., beach and highway clean up, volunteering for Cancer Walks, serving food at homeless shelters). A really powerful service experience is the Alternative Spring Break program where 25 students spend their vacation out-of-state working for Habitat for Humanity.

Lasting friendships and bonds between students and with RAM staff are forged by such an intense experience away from home and family. Engagement and RAMily are important ingredients that contribute to student persistence.

Infrastructure

For a program to serve students effectively, supportive infrastructure (often referred to as scaffolding) is essential. Key components of the RAM infrastructure are:

(1) Physical Space. The RAM Program is centrally-located in the College Library, an attractive building that also houses the tutoring center, writing center, and faculty development center. The RAM suite of offices includes a large conference room that

is used by students throughout the day for study and socializing. Some call it RAM CENTRAL.

(2) Priority Registration. The overriding RAM goal is to see students graduate in 4 years. At many institutions a barrier to graduation on-time is the fact that students are thwarted from registering for required courses in the normal sequence because they are closed by the time the student registers. RAM Scholars avoid that stumbling block because the Registrar accords them the privilege of priority (e.g., first day) registration for courses during all four years at FSC.

(3) Faculty Development. Faculty are the mainstay of college education. The RAM Program relies on faculty members to mentor students in research effectively, to engage students with active learning pedagogies, and to practice culturally-responsive teaching and promote social belonging for their high-need RAM Scholars. To that end, RAM has worked to assure that faculty are provided with professional development opportunities and programs that will help them to become better teachers, mentors, and allies of RAM Scholars.

Literature Review

The RAM Program is informed by earlier research and studies that address: (1) student retention, (2) the needs and challenges of high-need students, and (3) interventions and remedies that appear to be effective in advancing academic achievement and 4-year graduation rates among high-need students. Classic studies of student retention (e.g., Tinto, Bean, Astin, Pascarella) were cited earlier in this paper with reference to the dynamic model on which the RAM Program is grounded. A considerable literature base exists regarding undergraduate student success in college, whether specific to student characteristics such as first generation college or low income (see for example, Thayer, 2000), or within specific fields, such as science, technology, engineering, and mathematics (STEM) (Tsui, 2007). This review provides a brief overview of the relevant literature behind the development, implementation, and assessment of the RAM program.

As noted, the RAM program was intended to increase the proportion of college students graduating within four years. One “High Impact Practice” (Kuh, 2008) selected for RAM was the First Year Experience (FYE) course. Use of these courses to familiarize students with the expectations of college and to introduce them to a cohort of peers has been well documented, particularly with high needs students or students in developmental courses (What Works Clearinghouse, 2016). First-year experience courses have been found to have a pronounced impact on the future trajectory of students (Fitzpatrick et al., 2020; Harvey et al., 2006; Upcraft et al., 2015). Interactions with the cohort and the RAM staff offering the FYE course were intended to foster increased sense of belonging in college, and at Farmingdale specifically, which has been shown to be important to college student success, especially for traditionally underrepresented groups such as the high needs students eligible for the RAM program (Bowman & Brandenberger, 2012; Hurtado & Guillermo-Wann, 2013; Maramba & Museus,

2011; Museus et al., 2017; Walton & Cohen, 2007) and within STEM fields (Estrada-Hollenbeck et al., 2011; Hurtado, 2007).

Regarding high-need students, challenges faced by first-generation college students include issues related to personal adjustment, cultural fit, financial stress, weak self-confidence regarding academic preparation and academic abilities, and lower self-esteem (Aspelmeier et al., 2012; Bettencourt et al., 2020; Chen, 2005; Vuong et al., 2010). Underrepresented minority students face similar challenges (Hernandez et al., 2013; Walton & Cohen, 2011). Researchers have examined psycho-social needs of high-need students such as the dealing with the "imposter syndrome" (Krumrei-Mancuso et al., 2013; Reynolds & Weigand, 2010; Sparkman et al., 2012). The RAM Program implements multiple interventions that stretch across all four years of the student's college experience to build community, enhance sense of belonging, combat feelings of isolation and of being an imposter, and help students access needed resources to be successful.

The RAM Program practices and encourages engaged pedagogies and high-impact practices such as learning communities, collaborative learning workshops, enhanced gateway courses that might include supplemental instruction, service learning, and culturally-responsive strategies for teaching and relating to high-need students (Duncan & Dick, 2000; Koch et al., 2017, 2018; Kuh, 2008; Mack et al., 2019; Peterfreund et al., 2008; Rocconi, 2011; Treisman, 1992; Webb, 1989). The RAM program also developed Collaborative Learning Workshops, which have been shown to encourage problem-solving and teamwork (Toven-Lindsey et al., 2015; Treisman, 1992), as well as student engagement, which is well connected to student persistence in college (Astin, 1984, 1985). Studies have also identified benefits of connecting FYE courses with mentoring (Fitzpatrick et al., 2020), which RAM did. RAM students engaged in mentoring from the RAM faculty and staff, as well as from their peers in the RAM program. Peer mentoring has been shown to be beneficial to student persistence (Mavrinac, 2005; Strayhorn, 2014; Waitoller & Artiles, 2013). Beyond mentoring, the RAM program built in intrusive advising from RAM-specific counselors, because such holistic advising and coaching are associated with enhanced student outcomes (Bettinger & Baker, 2011; Lee et al., 2009; Rodgers et al., 2014).

Finally, as the name suggests, the signature feature of the Research Aligned Mentorship Program is mentored research. It is a powerful intervention that RAM Scholars experience. There is a wealth of resources on mentored research (Byars-Winston et al., 2015; Hensel, 2018; Ishiyama, 2007; Lopatto, 2016; Pfund C, 2016; Prunuske et al., 2013; Temple L, 2010). While many studies of the benefits of early college research experiences focus on STEM fields (James & Singer, 2016; NASEM, 2016; PCAST, 2012; Rosenberg et al., 2017; Saw, 2020; Tsui, 2007), these expereinces have been shown to benefit students outside of the STEM fields, as well (Hurtado & Guillermo-Wann, 2013; Sell et al., 2018; Walters, 2018). RAM actively worked to create and/or identify opportunities for undergraduate student research both on- and off-

campus, in part by working with faculty to develop capacity to conduct research with students and not through course-based opportunities such as CUREs (Russell et al., 2015).

Positionality

This research is based on a federally-funded project on which the first author was principal investigator, the second author was the external evaluator, and the third and fourth were project directors. Beverly Kahn has had a 47-year career in academia as a Professor of Political Science and then College Administrator (Dean of Arts and Sciences, Associate Provost, VP for Internationalization, and Provost/Academic VP) at five institutions. During that time, she secured funding for - and implemented – a great number of major student-focused projects (FIPSE, Title III, SSS-TRIO, NSF S-STEM). This background equipped her with the knowledge, skills, experiences, and values that she was able to draw upon when envisioning, creating, implementing, and assessing the RAM Program. Kate Winter has been conducting evaluations of federally-funded programs since 2003, specializing in projects to broaden college participation (particularly in science, technology, engineering, and mathematics). As Director of the RAM Program, Erwin Cabrera is able to relate to the RAM Scholars because he shares their background. He is an underrepresented minority, first-generation college student and child of immigrants who excelled as an undergraduate at the University of Maryland, Baltimore County where he was a Meyerhoff Scholar and participated in the NIH Health Minority Access to Research Careers Program. He earned a PhD in Biomedical Sciences from the NYU School of Medicine and, in 2016, joined the FSC RAM Program, ready to give back, providing students like himself with an enriching college experience. Lisa Cullington is the Assistant Director of the RAM Program who interacts with RAM Scholars daily as an adviser and instructor of RAM 201 and who also matches many students with research mentors. She relates well with high-need students as she grew up in a low-income household and was a first-generation college student. Before coming to FSC, she spent several years as a K-12 educator of immigrant students and earned a PhD in Urban Education, Leadership, and Policy Studies from the University of Massachusetts.

Methods

This study used mixed methods to collect and interpret qualitative and quantitative data from multiple sources in order to understand both the impact of the RAM program on participants, as well as the efficacy of the program model. While the funding agency prioritizes quantitative assessment of observed academic outcomes (i.e., enrollment, retention, grade-point average, graduation), this study incorporates student perceptions of experiences, as well as the perceptions of project staff, to obtain a more complete picture of lived experiences within the RAM program. An integration of methods (Greene, 2008) took place at the evaluation design, data collection, and analysis levels. Real-time integration of qualitative and quantitative methods is well supported in evaluative research (Mason et al., 2020; Perfetti et al., 2020).

Data and Variables

Institutional records provided data on year-to-year retention, annual GPA, annual credits earned, and graduation status, as well as student characteristics such as gender, race/ethnicity, first-generation college status, prior academic achievement, and Pell eligibility status. Program records provided details of random assignment to the treatment or control condition, as well as compliance with assignment and participation in interventions. A pre-post survey instrument administered during the first couple weeks of entering college and again during the month of graduation solicited student perceptions of aspects of college adjustment, sense of belonging, sense of community, sense of self-efficacy in completing college, and involvement in campus activities. Additionally, RAM program staff used a rubric to score levels of student engagement with the program, which allowed comparison with attendance data. Student-level data was matched using a deidentified study code to protect student confidentiality.

In general, completing a year of college and returning the next year are highly correlated. For this reason, the quantitative outcomes explored included a progression over time regarding whether a student is “on track” to graduate within four years; specifically, whether students end the first year with at least 30 credits, the second year with at least 60 credits, et cetera. Some students stop-out for single terms during the year or do not maintain full-time credit loads. Monitoring the earned credit accumulation at the end of each academic year permits a general understanding of the likelihood of students finishing a 4-year degree in four years. Additionally, average annual GPA was explored as a proxy for academic success and likelihood of graduating in four years. In addition to the student characteristics and baseline score of academic achievement, whether students entered through an associate degree or a baccalaureate degree program is included as a covariate, as it relates to credits earned and progress to degree. Figure 2 provides an overview of the study design, showing the various types of data across the stages of the program.

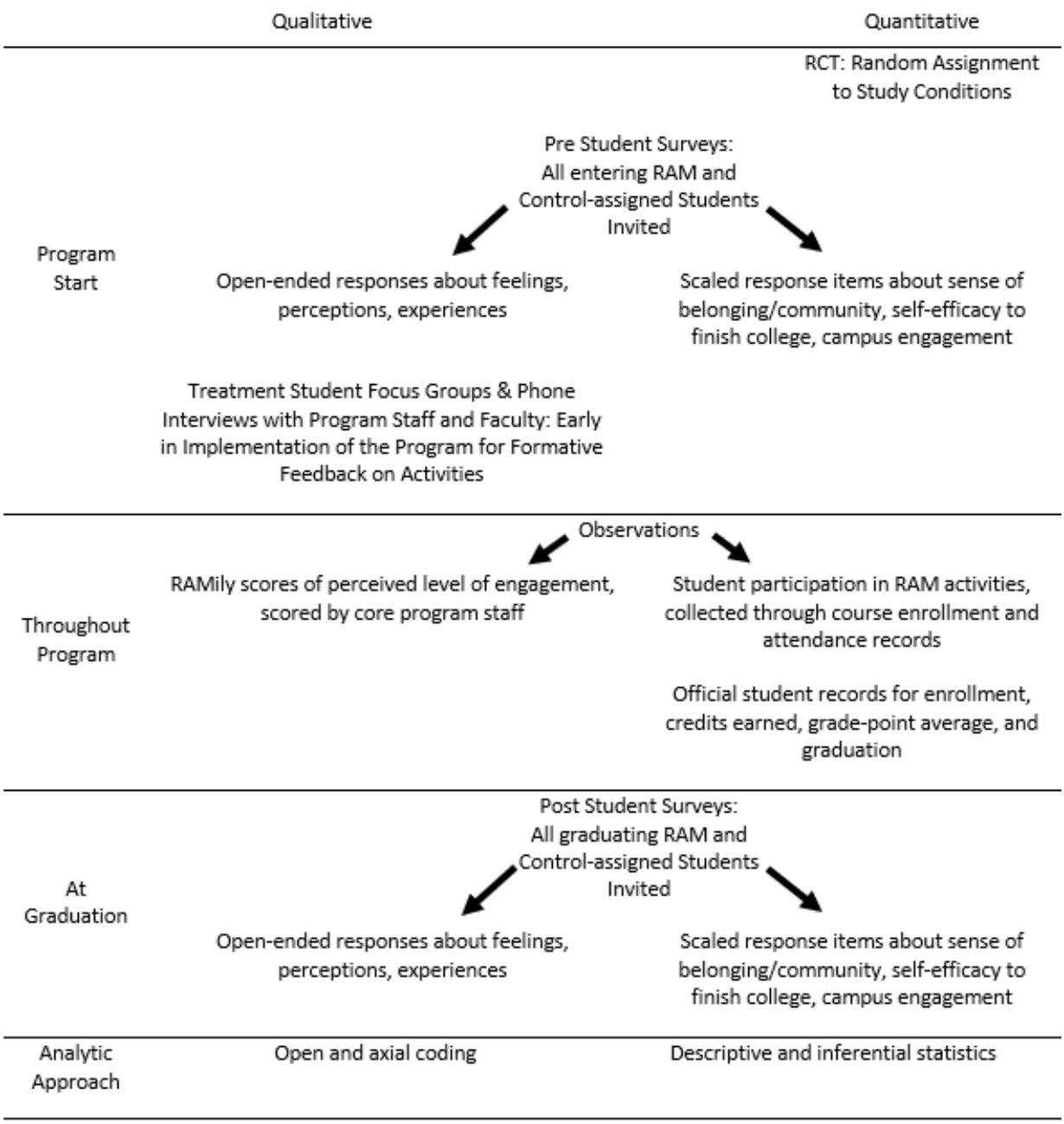

Figure 2. Mixed Methods Study Design

Since Fall 2016, there have been four cohorts of students in the RAM program study. Across the cohorts, there are 1,462 students, with 839 students assigned to the RAM treatment group and 623 non- RAM control group students. Baseline equivalence was not established for the treatment and control groups on one of the What Works Clearinghouse (WWC, 2019) baseline covariates of interest for postsecondary education research: prior academic achievement (scored on the SAT 2016 scale), with RAM students scoring slightly higher (M=911) than control students (M=874; t=4.11; df=1,182; p<.001). The standardized effect size of the difference is very small (Cohen's d = 0.2). There are no statistically significant differences between mean

scores of the treatment or control groups on the other WWC covariate, Pell eligibility, or by gender, URM status, or first-generation college status. All covariates are included in the regression models to account for potential selection bias. Only students with data for all variables are included in the quantitative analysis.

While all cohorts have completed the pretest, only cohort 1 has completed the posttest. Further, the posttest survey was administered to graduating cohort 1 students during the peak of the COVID-19 global pandemic when all activities with students were forced online, and the response rates were far lower than desired (21% overall response rate; 28 of 101 RAM students (28%) and 6 of the 61 (10%) control students). Similarly, with the majority of the second academic term of the 2019-20 year taking place virtually, it was deemed inappropriate to attempt to have program staff determine RAMily scores for this academic year, which are calculated by program staff after they spend the first two years with students. The pandemic impacted the second year for cohort 3 and the first year for cohort 4, resulting in study scores being unavailable for many students.

Only cohort 1 has been in the study long enough to have returned for and completed their fourth year, while cohort 2 has outcome data through returning for and completing their third year, cohort 3 has outcome data through returning for and completing their second year, and cohort 4 has outcome data through completing their first year. Accordingly, the quantitative analytic sample sizes vary by outcome measure, with the largest samples for the outcome variables in earlier years. Similarly, staff observation data are available for only the first two cohorts and pre-post survey responses are only available for cohort 1. An overview of the progression of each cohort over time through the 4-year program by treatment or control condition is provided in Table 2 (Appendix 2).

Only one of the control-assigned students engaged in any of the treatment interventions and 19 (2.3%) of the treatment-assigned students did not engage in any activities (Table 3, Appendix 3). The largest portion of treatment-assigned students (330 of 839; 39.3%) engaged in 4 of 6 interventions. As cohort 4 would not have yet engaged in their year 2 activities, and not all cohort 3 members had finished their research due to summer cancellations due to COVID-19, these figures are more meaningful by cohort, as provided in Table 4 (Appendix 4). As only the one control-assigned student engaged in activities, only RAM students are depicted in Table 5.

Table 4 provides the portion of RAM students who engaged in each intervention. Since not all RAM students needed to take the mathematics courses to which the collaborative learning workshops were attached, this intervention was not required of all RAM-assigned students. While the mentored research experience is a cornerstone of the RAM program, not all students complete the experience as early as intended in the program (i.e., in the summer following their second year). Summer 2020 saw several students' planned research cancelled due to COVID-19 travel and gathering restrictions. The College was closed to in-person teaching and research and many off-campus research placements were cancelled. While cohort 4 was technically engaged in their year 1 activities and not engaged in the second-year experience

(Introduction to Research Course) or mentored research in year 1, several students participated early.

RAM activities that begin in the first year (i.e., the FYE course, RAM counseling, and the use of the digital "roadmap to 4-year graduation") were experienced by a majority of each cohort (95% - 100%). Participation corelates too highly between these three variables to explore them individually ($r=.97$; $r=.97$; $r=.99$; all $p<.01$), which makes it impossible to tease out quantitatively any unique influence each intervention may have had. Supplemental analysis drawing on qualitative data from participants will be conducted to understand perceived relative contributions to their success. In the meantime, an overall "dosage" score was calculated to permit exploration of a potential cumulative impact of all of the interventions (distributions provided in Table 3).

Analysis

While this intervention was conducted through a Randomized Controlled Trial (RCT), students at colleges and universities do not necessarily adhere to their randomly-assigned conditions, which can make detecting true treatment effects challenging. To better understand the actual treatment effect on students who engaged in programming, as well as to explore potential differential impacts of exposure to different interventions and numbers of interventions, we also explored "treatment on the treated," controlling for baseline covariates to account for selection bias. This paper provides the findings from this analysis. Quantitative analysis includes descriptive statistics, independent samples t-tests, bivariate correlations, and multivariate regression (logistic regression for the dichotomous outcomes of "on track" and "graduated"). All tests of significance use an alpha of .05. Quantitative findings were explored in the context of qualitative data from matched students, when available, using both RAMily scores and survey responses. Qualitative data were open and axial coded to identify core elements in students' perceptions and shared experiences, as well as themes across students.

Findings

Institutional Data

Per the conceptual framework (Figure 1), engagement in treatment activities was intended to increase participants' college self-efficacy, sense of belonging, annual GPA, number of earned credits, and year- to-year retention, which were all predicted to increase 4-year graduation rates. Using institutional data and the measure of student engagement in treatment activities (dosage), all but the first two outcomes could be tested. Monitoring over time, there are 17 outcome variables explored, representing annual GPA, credits earned, whether students were "on track" with their cumulative earned credits to graduate in four years, whether they returned the following year, and measures of cumulative GPA during the study and whether they graduated.

For each outcome, separate regression analyses were conducted, controlling for whether the student is female URM, male URM, male white (all compared against female white), Pell

eligible, academic achievement baseline (bottom and top thirds as compared to the middle third), first-generation college, and whether the student entered through an AAS program, rather than a BS program (which is not applicable for year 4 outcomes, as no cohort 1 students were AAS). As noted, sample sizes vary by outcome as not all cohorts have completed all four years. Further, only the measures of "returned" and "graduated" are explored against the full entering sample; other analyses follow only persisting students for the treatment and control groups equally. Because the focus is on whether and to what extent the treatment influences the outcomes controlling for other factors, only the coefficients for "dosage" on each of the 17 individual outcome variables are provided with the sample size and significance level (Table 5, Appendix 5).

As can be seen in Table 5, higher scores on "dosage" positively associate with all of the intended outcomes, except for the number of credits earned and GPA in the fourth year. Students who actively participated in RAM treatments were more likely than students who did not participate to perform better in their first three years in their coursework (annual GPA), to earn more credits each year, to return the subsequent year, and to graduate within four years. While the coefficients are small, they demonstrate about a 20% increase in the likelihood of being "on track" to graduate within four years for each of the first three years of participation. Further, students with higher engagement in treatment activities are 14% more likely to graduate within four years. This provides evidence that the RAM interventions were successful in increasing 4-year graduation rates of participating students.

RAM Staff Observations

RAM staff provided engagement ratings for all RAM students, which were combined into an overall "RAMily" score. These scores were based on the level of familiarity each staff member had with each student and their perceptions of student engagement with the program. As a largely commuter campus, it is not uncommon for students to be on campus only long enough to attend required classes and activities, without spending time in community with faculty, staff, or other students (Burlison, 2015). The RAM program intended to support students in making time for community-building and engagement. It was predicted that the RAMily scores would correlate more highly with dosage scores, but it appears that a sizable portion of RAM students were able to participate in high numbers of RAM interventions without spending enough time with RAM staff to score highly in their ratings ($r = .47$; $p<.01$; Table 6, Appendix 6). RAMily scores have higher correlations with being "on track" in years 3 and 4 and with graduation, than do dosage scores, but dosage correlates more highly in the first two years. This means students who continue to engage closely with the RAM program after the first two years are more likely to do better in their final two years and, ultimately, to graduate on time. RAMily also has a higher correlation with cumulative GPA than does dosage. As predicted, being scores for whether a student is "on track" to graduate within four years correlates highly with whether students actually graduate in four years.

Student Perceptions

With only 34 graduating students completing the posttest, this subsample of data does not have much statistical power. Responses were matched to the quantitative data set and explored for relationships with RAMily scores, dosage, and whether students were "on track" to graduate each year. Only four items had statistically significant correlations. Responses to the item, "I am satisfied with the extent to which I participated in social activities," correlates with RAMily ($r=.47$, $p<.01$), dosage ($r=.42$; $p<.05$), and being "on track" at the end of both year 2 ($r=.40$; $p<.05$) and year 4 ($r=.58$; $p<.01$). The item, "I feel like a part of Farmingdale State College," correlates with RAMily ($r=.42$; $p<.05$), dosage ($r=.35$; $p<.05$), and being "on track" at the end of year four ($r=.47$; $p<.05$). Likewise, responses to the item, "I have several close ties at this college," correlate with dosage ($r=.38$; $p<.05$) and with being "on track" at the end of year four ($r=.52$; $p<.01$). Finally, responses to the item, "Are you considering a major or career in research," correlates at a statistically significant level only with dosage ($r=.42$; $p<.05$) and RAMily ($r=.40$; $p<.05$). These connections provide some proof of concept that participating in RAM activities associates with increased perceptions of sense of belonging, as well as with increased likelihood of pursuing majors or careers in research.

Students were also asked to provide "in their own words" their plans for after graduation. While most students offered details about graduate programs to which they had been accepted, or jobs they had already secured in their fields, one offered a specific reflection on the impact of participating in the RAM program:

> *After graduation I plan to work in my field in a full time position. I am actually grateful now to have a starting job in the field, even though it might not be the perfect job for me, it is good experience. I would have never been able to be in the position that I am in without the support of Farmingdale State College and the RAM program.*
>
> *– RAM 2020 Graduate; Dosage score 4 (of 6); RAMily score 7 (of 25)*

That this student chose to credit the school and RAM program is particularly interesting given that this student was not scored highly by the RAM staff and had an average dosage score. Additional items are being added to the posttest in order to solicit additional reflections on the impacts of the RAM program by activity to increase the ability to understand how the program positively impacts students' persistence and graduation.

Distinctive Achievements – Research Placements

The superior performance of RAM Scholars is reflected in their rates of retention, cumulative GPA, and mean credits earned year-to-year. In addition, a truly distinctive achievement of the RAM Program is the participation of RAM Scholars in mentored research experiences outside of the normal classroom. Prior to the creation of the RAM Program, only a handful of FSC students had engaged in research with faculty on campus and about 2-4 a year participated in off-campus placements. That changed with the arrival of the RAM Program. To date, from fall 2017 through summer 2020, 301 RAM Scholars have participated in research – 181 in on-campus

placements with faculty and 120 in off-campus placements at other universities, research labs, and businesses. Additionally, for the first time ever, FSC students (all RAM Scholars) applied for and won competitive scholarships for summer research. The funding sources included: NSF REU's, the Leadership Alliance, the NYU Undergraduate Intern Program, and the Summer Health Professions Education Program. It should be noted that, for summer 2020, nine more RAM Scholars were offered funded off-campus research; unfortunately, those programs were cancelled due to the COVID-19 Pandemic. A partial list of distinctive off-campus placements includes:

- Bowie State University
- Broadhollow BioScience Park
- Brookhaven National Labs
- California State University Chico
- CUNY Building Performance Labs
- Feinstein Institute
- John Jay College - CJ
- Johns Hopkins University
- Memorial Sloan Kettering Med Center
- Montana State
- Morgan Stanley
- Rutgers University
- Stanford University
- Stony Brook University
- University of California Berkeley
- University of Florida
- University of Miami
- University of Nairobi Kenya
- University of Nebraska

Discussion, Lessons Learned, and Implications

This study establishes that minority, low-income, and first-generation college students - who disproportionately fail to complete college - thrive and succeed when they experience a carefully- orchestrated four-year program that engages them in curricular, co-curricular, and extra-curricular programs and activities. The more opportunities for engagement that are provided across all four undergraduate years, the greater the impact. The following list identifies key lessons that are derived from the success of the RAM Program at Farmingdale State College:

(1) With a carefully-orchestrated program, any institution (and especially those like FSC that are second- tier public institutions where the bulk of America's high-need

students attend) can change the lives and trajectories of their students, including those who arrive with lower levels of prior academic achievement.

(2) The first two years are key. RAM orientation and welcome programs, as well as a First Year Seminar for RAM students, ease adjustment to college. Collaborative Learning Workshops attached to problematic gateway courses (such as in mathematics) enable students to learn and perform better, while active student-centered pedagogies such as learning communities in the first years engage and motivate students.

(3) Holistic advisement and counseling across all four years are important supports and guides for students. Due to their close relationship with their advisees, RAM counselors are able to identify problems, help the students overcome them, and thus help students complete their graduation requirements.

(4) Building a close-knit community among students that fosters belonging and engagement contributes to student satisfaction and persistence. Through RAM coursework, service-oriented projects, social activities, field trips, peer mentorship, and ongoing social media communication, RAM Scholars engage with each other and with RAM staff. The result is a strong bond and support system among students – which is especially important because 96% of RAM Scholars are commuter students. Creating "RAMily" is hard work, but it clearly pays off with superior year-to-year retention of RAM Scholars.

(5) Embedding a program in the academic curriculum is important. RAM is more than a support program. It provides students with credit-bearing RAM and RAM-approved coursework that counts toward graduation requirements. Students appreciate that RAM courses are central – not ancillary – to their degree and they understand that, by accumulating credits they are making progress toward graduation.

(6) Successful and rigorous programs for high-need students that contain research components need not be restricted to honors students. RAM is not an honors program. FSC's anonymous random selection of students yields a cohort of students with varying records of prior academic achievement. Yet, through the carefully orchestrated and multifaceted program, combined with peer support and community, RAM scholars succeed, complete serious research projects, and graduate.

(7) Institutions can implement effective programs without awarding scholarships to students. This lesson is especially important for institutions like FSC without large endowments.

(8) Experiential Learning through mentored hands-on research is powerful and often transformative. The RAM experience also teaches that mentored research is most effective when students are first given a formal introduction to research before they are thrust into a strange and intimidating research setting. Furthermore, the Farmingdale success in placing students in research on campus with faculty mentors and also off-campus in research at other universities and labs (including helping

them apply for competitive summer grants such as NSF REUs) indicates that any institution can make a commitment to student research. Even at primarily teaching institutions that do not have graduate programs and extensive research labs, faculty can give their students mentored research experiences that enhance learning and open new doors for post-graduate study and careers.

(9) Early and continued buy-in from the college community is important for the success and institutionalization of a new program. Leadership is key. The RAM program was led by the former Provost of the College. Even while designing the program, she consulted with all constituents – the President, Provost, Deans, and Department Chairs, as well as key faculty and professional staff. Once the program was launched, she assured that faculty were supported and became engaged and that program successes were communicated widely across the College. An internal campaign to highlight a program's achievements is important. Ongoing recruitment, training, and involvement of more faculty each year (as the program grows and new faculty are hired) creates a bulwark of enthusiastic support that, in turn, cements the institutionalization of a new program.

Conclusion

The RAM Program at Farmingdale State College in New York was born as an answer to a difficult question: What can be done to raise the 4-year graduation rate of students who are under-represented minorities, first-generation college, and low income? Based on a model from UCLA – an institution quite removed from the reality of a second-tier commuter campus like FSC – and cognizant of what the vast literature on student attrition versus persistence considers important, a successful grant was written that allowed FSC to serve as an education laboratory. As part of the experiment, it was hypothesized that, if one created a multifaceted program, the 4-year graduation rate could climb by 20%. percentage-points. As good scientists, a rigorous evaluation of the results was proposed: a randomized selection of a treatment group and a control group, along with a battery of quantitative and qualitative measures. In the end, the experiment succeeded. Something new was created that raised the 4-year graduation rate of the treatment group by 29% over the 2015 IPED's rate that was cited in the FIPSE grant application (and 18% over the 2018 IPED's rate).

It needs to be acknowledged that an unexpected variable did bedevil the experiment. A global pandemic did contaminate some of the results. The first - and most important - cohort of students who matriculated in fall 2016 was in its very last semester before graduation in March 2020 when the virus caused the College to end in-person classes and other on-campus activities; the College shifted to remote learning. Many components of the RAM Program were affected – no in-person RAM counselling, no Alternative Spring Break with Habitat for Humanity, no RAMdom Acts of Service, no events in the RAM Conference Room (aka RAM Central), no on-campus speakers or other mass gatherings. For Cohort #1, graduation took place on Zoom (though some RAM staff organized a noisy caravan of decorated cars that

travelled to the homes of RAM grads). Even more disruptions were created for Cohorts #2, #3, and #4.

For example, the summer REUs for which RAM Scholars has been accepted were all cancelled. It should be mentioned, however, that RAM-affiliated faculty in various disciplines did step up and created a new type of remote research project opportunity over this past summer. As is indicated in this paper's evaluation section, some data collection – particularly in the qualitative realm – was limited by the pandemic. As a consequence, some of the measures of student perceptions and attitudes regarding their college experiences are missing or constrained by smaller than needed responses. In the current situation, seeking responses from the members of the control group is more difficult. FSC must await the return to normalcy before those results can be obtained from future cohorts and properly analyzed.

One final lesson should be shared. While many programs disappear after their grant money has been exhausted, the FSC RAM Program has a bright future before it. With rigorous evaluation, measurable results, and a wide circle of supporters (including the College President and Provost), the College has picked up the key expenses that were originally underwritten by the grant. Support will only grow as RAM Scholars become RAM alumni, the skilled local workforce and local economy profit from the presence of those alumni, and both the parents of RAM students and local legislators come to understand the savings realized when students progress to graduation in just four years.

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Appendix 1

Table 1. Contrasting FSC and UCLA Characteristics of Full Time Undergraduates – IPEDS data Fall 2018

	Total Enrollment	Total 1st Time Students	SAT Reading Writing*	SAT Math*	ACT Comp*	Year 1-2 Retention	4 Year Graduation +	6 Year Graduation +
FSC	7,575	1,315	580	580	24	84%	31%	53%
UCLA	31,000	6,233	740	780	34	97%	74%	91%

* 75th Percentile

+ 2010 Cohort

Appendix 2

Table 2. Overview of Progression by Cohort and Study Condition Assignment

	C1		C2		C3		C4	
	RAM	Control	RAM	Control	RAM	Control	RAM	Control
Randomly Assigned	206	156	205	165	232	151	208	168
Confirmed Eligibility [a]	206	155	204	165	232	151	197	152
Completed Yr1	191 (93%)	144 (93%)	193 (95%)	152 (92%)	217 (94%)	137 (91%)	183 (93%)	136 (89%)
Completed Yr2 [b]	163 (87%)	118 (83%)	162 (84%)	119 (78%)	191 (88%)	115 (84%)	n/a	n/a
Completed Yr3 [b]	146 (90%)	109 (92%)	150 (93%)	100 (84%)	n/a	n/a	n/a	n/a
Completed Yr4 [b]	142 (97%)	95 (88%)	n/a	n/a	n/a	n/a	n/a	n/a
Graduated [c]	101 (49%)	61 (39%)	n/a	n/a	n/a	n/a	n/a	n/a
RAMily Scores	136 (66%)	0 (--)	163 (80%)	0 (--)	n/a	n/a	n/a	n/a
Participation Scores	195 (95%)	1 (<1%)	200 (98%)	0 (--)	231 (100%)	0 (--)	195 (94%)	0 (--)
Pre-survey	119 (58%)	73 (47%)	155 (76%)	30 (18%)	158 (68%)	27 (18%)	172 (87%)	1 (<1%)
Post-survey [d]	28 (28%)	6 (10%)	n/a	n/a	n/a	n/a	n/a	n/a

[a] Matriculation was a criteria for eligibility, but random assignments had to be made in summer to accommodate registration and course planning. This is the figure used for calculating attrition.

[b] Percentages continuing each year are based on the total from the prior year

[c] Percentage graduated is based on entering cohort.

[d] Percentage post-survey response is based on the number of graduating students invited.

Appendix 3

Table 3. Random Assignment by Number of Interventions Experienced

		Randomly Assigned Condition					
		Control		Treatment		Total	
Number of Interventions Experienced	0	622	99.8%	19	2.3%	641	43.8%
	1	0	0.0%	5	0.6%	5	0.3%
	2	0	0.0%	12	1.4%	12	0.8%
	3	0	0.0%	173	20.6%	173	11.8%
	4	1	0.2%	330	39.3%	331	22.6%
	5	0	0.0%	238	28.4%	238	16.3%
	6	0	0.0%	62	7.4%	62	4.2%
Total		623	100.0%	839	100.0%	1,462	100.0%

Appendix 4

Table 4. Rates of Participation by Intervention for RAM Students by Cohort

	C1		C2		C3		C4	
RAM	N=206		N=204		N=232		N=197	
FYE	195	94.7%	197	96.6%	224	96.6%	188	95.4%
IAC	195	94.7%	200	98.0%	232	100.0%	197	100.0%
RMP	195	94.7%	200	98.0%	224	96.6%	188	95.4%
CLW	86	41.7%	65	31.9%	93	40.1%	83	42.1%
SYE	156	75.7%	157	77.0%	184	79.3%	4	2.0%
MRE	80	38.8%	58	28.4%	29	12.5%	14	7.1%

FYE: First Year Experience course
IAC: Intensive Academic Counseling
RMP: Digital Roadmap to 4-year graduation
CLW: Collaborative Learning Workshop
SYE: Second Year Experience course (introduction to research)
MRE: Mentored Research Experience

Appendix 5

Table 5. Standardized Beta Coefficients for "Dosage" by Outcome Measure

	N	β	sig.
GPA Y1 [a]	1,353	.084	**.001**
Credits Earned Y1	1,353	.232	**.000**
On Track Y1 [b]	1,353	1.211	**.000**
Returned Y2	1,462	.115	**.000**
GPA Y2 [c]	868	.080	**.012**
Credits Earned Y2	868	.166	**.000**
On Track Y2	868	1.193	**.000**
Returned Y3	1,113	.092	**.002**
GPA Y3 [d]	505	.137	**.001**
Credits Earned Y3	505	.149	**.001**
On Track Y3	505	1.196	**.000**
Returned Y4 [e]	724	.214	**.000**
GPA Y4 [f]	237	.047	.462
Credits Earned Y4	237	.002	.973
On Track Y4	237	1.119	**.041**
Cumulative GPA [g]	1,462	.129	**.000**
Graduated [h]	1,462	1.138	**.001**

[a] Year 1 outcomes available for C1, C2, C3, and C4
[b] Beta for “On Track” logistic regressions is the exponentiation of the B coefficient, which is an odds ratio
[c] Year 2 outcomes available for C1, C2, and C3
[d] Year 3 outcomes available for C1 and C2
[e] Six cohort 1 students graduated prior to their fourth year; total N is remaining C1 and C2 students
[f] Year 4 outcomes available for C1 only
[g] Cumulative GPA includes all available years for each cohort
[h] Graduated includes all cohorts

Appendix 6

Table 6. Bivariate Correlations between Scores for Dosage, RAMily, and Key Outcomes

	N	Dosage	RAMily	Graduated	Cum GPA
RAMily	1462	0,47 **	--		
Graduated	1462	0,11 **	0,31 **	--	
CumGPA	1361	0,08 **	0,12 **	0,12 **	--
OnTrackY1	1353	0,20 **	0,13 **	0,08 **	0,43 **
OnTrackY2	868	0,19 **	0,15 **	0,15 **	0,48 **
OnTrackY3	505	0,20 **	0,23 **	0,25 **	0,41 **
OnTrackY4	237	0,12	0,21 **	0,49 **	0,30 **

** Correlation is significant at the 0.01 level (2-tailed).

Appendix 7: RAM Student Voices: Reflections on Research

Student #1

Major: Applied Mathematics

Experience Type: Internship with the Internal Revenue Service (IRS)

Location: IRS, Washington, DC

Project Focus: Predict the amount of enforced revenue that will be collected in the next fiscal year

The Experience: "I was added to a team with four other data scientists. The goal of my project was to use different forecasting models to predict how much enforced revenue the IRS will be receiving in the near future. I used SQL to pull in data from the IRS databases and used R to set up the data, visualize relationships between different variables using graphs, and analyze trends. We also used econometric models to predict the state of the economy as it has a strong relationship with tax revenue. My work was left with my former co-workers and will be used to settle taxing decisions."

The Benefit: "The first few weeks were the most stressful as I was essentially crafting a capstone project in a field I have never touched before while utilizing software I was inexperienced with. With enough perseverance, I was able to complete a project that has greatly affected the federal government all while receiving training for essential skills on the job. Solving problems that have never been tackled before always brought me a feeling of accomplishment which was essential to building my motivation. Living away in Washington D.C. for three months not only taught me professional skills, but also granted me the potential to strive further in my career and realize that it's best to live life to the fullest."

Words of Wisdom: "I would never have thought I would be an intern working a major project that would benefit the IRS. Competing for an extremely selective position and succeeding made me realize that anything is possible. It's best to start early and start searching for opportunities as early as possible. As Rabindranath Tagore once said, 'you can't cross the sea merely by standing and staring at the water.'

Student #2

Major: Bioscience

Experience Type: Off-campus research experience

Research Mentor: Rosalia Davi

Location: Stony Brook University

Project Focus: The Effects of Low Intensity Vibrations on the Cytoskeleton of T Cells for CAR T Cancer Therapy

The Experience: "During my summer, I was enrolled into the REU at Stony Brook University for Nanotechnology, Health and Environment. I was able to work with Dr. Mei Lin Chan in the Department of Biomedical Engineering. I worked on a new cancer therapy called Chimeric Antigen Receptor T Cell therapy. CAR T cell therapy is a new form of immunotherapy that specially alters T cells to target cancer cells. I presented my research to experts in the field. This research is important because it can have a large impact on the medical field as well as a deeper understanding of CAR T therapy."

The Benefit: "This research experience benefited me because it allowed me to gain a deeper understanding of what it's like working in a prestigious research facility. I was able to attend weekly seminars on how to conduct research and the potential careers in the field. This experience has allowed me to grow as an individual and it has made me very motivated to see what impact my research could have on the science community as well as the medical field. This experience made me develop a deeper passion to work in the field of medicine to learn more about different illnesses and to help patients."

Words of Wisdom: "Doing research can open up many opportunities for the future. It also very interesting getting to focus on a project and learning the different techniques required to complete it. Choose a subject that interests you so that you enjoy working on it."

Project Funding Source: National Science Foundation, Research Experiences for Undergraduates

Student #3

Major: Applied Psychology

Experience Type: On-campus research experience in personality perception on social media

Research Mentor: Dr. Sayeed Islam (FSC)

Location: Farmingdale State College

Project Focus: Perceptions of personality through Instagram profiles

The Experience: "I worked with Dr. Islam on a research idea I proposed in my RAM 201 course. I was responsible for reading many related research articles, planning out how I want to conduct my research, what profiles I want to focus on, creating a survey using Qualtrics, and getting IRB approval to conduct my research. I have already had the opportunity to present my research proposal at the SUNY Applied Learning Conference in Tarrytown, NY. I have future presentations planned to disseminate my research."

The Benefit: "I have learned to appreciate research, understand that research is not scary, and that research is another format for learning. Research is something that takes a lot time and commitment. I know that my involvement in conducting my own research with the guidance of Dr. Islam will most definitely help me get into graduate school because not many students have the opportunity to say 'Yes, I conducted my own research while acquiring my undergraduate degree.'"

Words of Wisdom: "Research seems scary and long. However, if you break up the research into manageable chucks with a time frame you can work with, then you can do it. A big plus side is when you find a topic that interests you, research will become intriguing because you will constantly discover new things along the entire journey."

*This research study has been published in the *Journal of Management and Innovation* with Dr. Sayeed Islam as co-author.

Student #4

Major: Business Management

Experience Type: On-campus research experience in blended interactions

Research Mentor: Dr. Brian O'Keefe (FSC)

Location: Farmingdale State College, New York, NY, & Patchogue, NY

Project Focus: To enhance user experiences using mixed reality

The Experience: "I worked on a team of students from Farmingdale State College and Edinburgh-Napier University in Scotland to develop mixed reality prototypes. I was responsible for giving input and developing ideas. We visited NYC's High Line Park and developed a virtual tour of the park. We also created several mixed reality proposals that would occupy the landscape. With another student, I designed a mixed reality game app that would help people visiting the High Line be more environmentally conscious about the Hudson River. We presented our work at Muñeca Arthouse in Patchogue, NY. This work will continue in Scotland in summer 2019."

The Benefit: "I was paid for this experience while I made new connections and gained valuable knowledge. I was able to meet new people. I also learned about new and emerging technologies and practice my public speaking skills."

Words of Wisdom: "RAM research is a great way to expand your mind. It allows you to meet new people that have similar goals as you. The RAM Program constantly opens new doors."

Student #5

Major: Computer Programming & Information Systems

Experience Type: Internship in web development

Location: Nature's Bounty Co., Ronkonkoma, NY

Project Focus: Full-stack development of business branded website and a business analytics project

The Experience: "For the website, I worked alongside a mentor and was responsible for the design, coding, mobile implementation, search engine optimization and overall efficiency of the website. The website is now live at spoonfuls.solgar.com. For the business analytics project, I worked with 6 other interns to analyze a critical business problem and propose a solution to it while also testing our solution to the entirety of the domestic consumer base. We also gave a presentation to the C-level executives (CEO, CIO, etc.) on the work we did and how implementing our plan could benefit the company."

The Benefit: "This experience bolstered my 'soft skills' such as teamwork and communication and honed my technical knowledge in web development (both front-end and back-end). It also allowed me the opportunity to work with powerful business analytics tools and programming technologies I may not have had the chance to work with otherwise. This internship made me develop a deeper passion for web development and programming while also working with a knowledgeable and caring team."

Words of Wisdom: "To those seeking to complete their RAM research experience, I would recommend looking beyond your major into similar fields since you never know what could trigger a response in you that makes clearer or even changes your career goals. For internships specifically, give your all when you work and learn as much as you can since your time there goes by so quick and you can learn valuable skills if you open up to those around you, even if the topic has nothing to do with your current projects (employers and your colleagues will take note of your initiative to learn). I recommend that when you are given work, be your own critic. Go over every little detail that can be done better or made faster. Your work matters here! Show your manager or boss that you are meticulous, put your best foot forward, and don't be afraid to ask, 'How can I do this better?'"

This last point I want to say without putting pressure on you: Remember that whether you are doing research or an internship, you represent not only yourself, but also the RAM Program and Farmingdale State College. Keep that in mind, look for ways to grow yourself and hold yourself accountable for whatever you do. While you shouldn't lose sleep over your work, you should be thinking of ways to truly showcase what you can do. Go the extra mile in your work or for someone else. In whatever you do, show what it means to be a RAM scholar."

Student #6

Major: Computer Engineering

Experience Type: Off-/On-campus research experience

Research Mentor: Dr. Paulo Castillo and Kwang Min Yu

Location: Farmingdale State College and Brookhaven National Lab, NY

Project Focus: A numerical study of coherent radiation from an induced plasma dipole oscillation created by two detuned lasers.

The Experience: "I worked with a partner to run simulations from a code created by my mentor to then analyze the physical theory and to help develop programs to better analyze the simulation data. Our actions helped refine the simulation code. A poster presentation was given at the end of the internship. Additionally, a paper using data collected from our simulations is in the process of being published. I am continuing this project by running simulations for the researcher to analyze."

The Benefit: "This experience has provided a deeper insight into coding and particle physics. I was able to meet like-minded individuals from universities from across the county. Additionally, this internship provided me a graduate level experience that has given me a better understanding of how research would be conducted within a graduate school. Overall, this experience has helped me gain a new perspective on my current career path."

Words of Wisdom: "Always do the best that you can do and don't worry too much about any set-backs you may face. Everything you do is something that you can learn from."

Project Funding Sources: Brookhaven National Laboratory, United States Department of Energy