Towards an understanding of the effect on summer programming on early engineering student outcomes

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Abstract

Starting in 2013, Large Midwestern University has conducted a yearly bridge program for 30-50 entering students from the state to get a head start on their transition from high school to university. The program, entitled Summer Scholars, consists of an eight-week residential program where students take a rigorous and intensive University course (e.g., chemistry, calculus) with other non-Summer Scholars participants, as well as a cohort-based elective (Engineering Projects, Research, or Professional Development). In addition to their coursework, students are mentored in successful student behaviors such as study skills and participate in activities that promote community-building and growth as engineers (e.g., local industry visits). While Summer Scholars is open to all students, in-state, underrepresented students (concerning race/ethnicity, gender, and rural counties) are targeted with special invitations and scholarships. Summer Scholars significantly differs from traditional summer bridge programs, as this program targets students looking to get a "head start" and experience university life before their first semester of classes, rather than targeting students seeking remediation coursework.

The primary objective of this study is to understand the effect of this summer programming on GPA, retention, pathway changes, and sense of belonging. We have collected data from three cohorts of this program through surveys reporting students' department, current GPA, demographics, and others. These surveys were used to create a purposeful sample of maximum variation for qualitative interviews with seven students from Summer Scholars 2018. We conducted 60-minute, in-depth semi-structured interviews with these students to understand their experience in Summer Scholars and at the University since completion of the program. We analyzed the transcripts from the interview using an inductive approach to coding the data to uncover themes. Results suggest that the Summer Scholars program impacts areas of undergraduate engineering students' university experience in the intended ways.

Introduction

Many colleges in the United States offer summer bridge programs to their students to increase retention and preparedness to promote student success [1]. Since 2012, the College of Engineering has conducted a first-year summer bridge program for 30-60 entering engineering students to get a head start on their transition from high school to university. The program, entitled Summer Scholars, is a residential program where students take any in-person course offered at the university (e.g., calculus, history) during the second eight-week summer semester, as well as a cohort-based elective course (Engineering Projects, Research, or Professional Development). While Summer Scholars is open to all students, in-state, underrepresented (in terms of race/ethnicity, gender, and rural counties), students are targeted with special invitation and scholarships. Unlike other engineering summer bridge programs, students are not required to take a technical course. Thus, some participants note using this program to complete a general education requirement to transition to university coursework before technical classes. Outside of the classroom, students are mentored in successful student behaviors such as study skills, how to use university student services, and how to become holistically involved at the university.

Summer Scholars was established to (1) promote the holistic development of entering engineering students, (2) develop a sense of community before their first semester of university, (3) introduce students to the academic rigor of a highly ranked four-year institution, (4) foster understanding of successful campus involvement, and (5) provide students with co-curricular experiences to develop their identity as an engineer. The primary objective of this study was to understand the effect of Summer Scholars on student long-term GPA patterns, retention, pathway changes, and sense of belonging.

Background

Underrepresented Students in Engineering

Despite the country's growing diversification, engagement in STEM is not reflecting this change [2]. Understanding the still-present underrepresented racial minority students (URMs) is complex, as there are numerous barriers present in both secondary and post-secondary educational institutions such as deficits in academic advising, uninviting environments resulting from adverse stereotypes, inadequate access to information about college preparation [1], and lack of family, faculty, and peer support [3]. In addition to underrepresented racial minorities, women continue to be underrepresented in engineering fields and experience many of the same barriers [4].

While navigating these barriers, underrepresented students additionally experience the rigorous curriculum inherent to undergraduate engineering programs. Studies have reported that URMs tend to score lower GPAs in their first semester [5]. Furthermore, low first-semester GPA is linked to low graduation rates for these underrepresented students [5]. Moreover, this is supported as URMs are less likely to graduate from undergraduate engineering programs [6]. This finding suggests that strategic implementation of interventions aimed to support traditionally underrepresented students as they transition before and after their first semester in an undergraduate engineering program might increase the graduation rate of this population.

Sense of Belonging

Of full-time students, students of minority racial groups have lower graduation rates [5]. Thus, promoting an environment where students can cultivate a sense of belonging is vital to promoting student success and retention of students at-risk of attrition [7]. Connections with as little as one other individual in the institution might influence their decision to persist in college [7].

Summer Bridge Programs

Traditionally, summer bridge programs are interventions implemented to support incoming first-year undergraduate students as they transition from high school to a post-secondary institution to increase retention and academic success of these students [8]. Conventionally, summer bridge programs are a multi-week experience during the summer before a student's first semester at a four-year university. During the multi-week period, students will take a common remedial course with a cohort of other first-year students to prepare them for the demands of college [1]. Most summer bridge programs have a shared goal promoting academic success through remediation courses; however, there are various approaches in doing so (eg., targeting underrepresented groups or underprepared students) [1].

Many universities have developed summer bridge programs to specifically support incoming engineering students and prepare them for the notoriously rigorous and demanding curriculum [9]. Furthermore, these programs often use selective invitations to target minority, women, or first-generation students [1, 9]. Additionally, many programs have been developed for conditionally admitted students, to promote retention and success for "at-risk" students [1, 10] and use low mathematics test scores and low mathematics course placement to identify students who need remedial courses [11]. Consequently, many STEM, or engineering-specific, summer bridge programs focus on mathematics preparation by incorporating a required mathematics course into the programming [8, 12,13]. Most commonly, student retention and GPA are measured to determine a summer bridge program's success [8].

Summer Scholars

Diverse Cohorts

The Summer Scholars cohorts are considerably more diverse with respect to underrepresented racial minorities (African American/Black, Asian, Hispanic, Multi-Race, and Native American) and women students compared to the total undergraduate engineering class, shown in Table 1. This difference is the result of targeted invitations and scholarships to traditionally underrepresented groups in engineering.

Table 1. *Demographic breakdown of Summer Scholar participants compared to the incoming first-year College of Engineering cohorts.*

Year	Demographic	Summer Scholars Participants	College of Engineering*
2016	***Race/Ethnicity***	***Percent (Number of Students)***	
	African American/Black	10.34% (6)	1.46% (23)
	Asian	17.24% (10)	29.76% (269)
	Hispanic	25.86% (15)	8.19% (129)
	International	5.17% (3)	17.51% (276)
	Multi-Race	8.62% (5)	3.62% (57)
	Native American**	5.17% (3)	0.76% (12)
	White	31.03% (18)	39.21% (618)
	Gender	***Percent (Number of Students)***	
	Male	55.17% (32)	73.03% (1151)
	Female	44.83% (26)	26.97% (425)
2017	***Race/Ethnicity***	***Percent (Number of Students)***	
	African American/Black	11.90% (5)	2.65% (45)
	Asian	14.29% (6)	30.15% (512)
	Hispanic	26.19% (11)	7.54% (128)
	International	4.76% (2)	17.73% (301)
	Multi-Race	4.76% (2)	3.89% (66)
	Native American**	2.38% (1)	0.53% (9)
	White	26.67% (16)	37.99% (645)
	Gender	***Percent (Number of Students)***	
	Male	54.76% (23)	78.54% (1264)
	Female	45.24% (19)	24.38% (434)

	Race/Ethnicity	*Percent (Number of Students)*	
2018	African American/Black	13.33% (6)	1.42% (24)
	Asian	11.11% (5)	32.57% (551)
	Hispanic	33.33% (15)	6.30% (107)
	International	8.89% (4)	15.08% (256)
	Multi-Race	6.67% (3)	4.67% (79)
	Native American**	4.44% (2)	0.59% (10)
	White	26.67% (12)	38.34% (651)
	Gender	*Percent (%)*	
	Male	68.89% (31)	74.29% (1257)
	Female	31.11% (14)	25.59% (433)

* College of Engineering data does not include Chemical and Agricultural and Biological Engineering students. Summer Scholars data includes Chemical and Agricultural and Biological Engineering participants.
** Native American is designated as a secondary race/ethnicity category, allowing students to identify as Native American in addition to another race/ethnicity.
*** Due to student self-reported data, discrepancies may occur.

At institutions that employ direct matriculation models, students sometimes lack exposure to working in teams with a diversity of disciplines in the classroom due to major-specific design courses. Thus, Summer Scholars works to explicitly incorporate team-based activities to encourage diversity of thinking across individuals from different backgrounds and disciplines. The diverse community of participants that Summer Scholars fosters aims to instill the value of diversity in these students before the fall semester, where the campus culture will shift significantly with respect to racial and gender representation. Furthermore, understanding that the majority of Summer Scholars participants are of traditionally underrepresented groups in engineering, these opportunities to engage across differences are designed to foster connections among students to promote a sense of belonging.

Scholarships

Summer Scholars scholarships allow students to attend Summer Scholars at no cost. Targeting in-state underrepresented students via scholarships serves as a recruiting tool to encourage underrepresented students to attend Summer Scholars. Additionally, this targeted invitation is intended to increase diversity for the College of Engineering as a whole as the opportunity of a cost-free summer bridge program might encourage admission acceptance. While some engineering summer bridge programs target underrepresented minority and women students, Summer Scholars additionally extends efforts to rural students, as rural students may be less likely to choose to study engineering without some intervention [14]. For example, a white male student from an in-state rural county would be offered a Summer Scholars scholarship, as students from rural counties are underrepresented in engineering programs [14]. Ultimately, these scholarships were designed to encourage the participation of students who are more likely to have a difficult time finding community and/or developing a sense of belonging upon matriciulation.

Holistic Student Development

Summer Scholars is unique compared to many summer bridge programs, as it focuses on holistic student development, rather than a primary focus of preparing students for the academic

rigor of an engineering program at a four-year university. An intentional combination of residential, classroom and extra-curricular experiences provides students with the opportunity to explore what it means to be an engineering student in multiple ways and allows them to understand the importance of incorporating a diverse set of experiences throughout the remainder of their undergraduate career. While we hope that Summer Scholars perform well academically during the program, Summer Scholars' primary goal is to promote peer interaction to increase a student's sense of belonging at the university, before and in preparation for their first semester.

Housing & Residential Advisors (RAs)

During the eight-week program, all students are housed in the same university residence hall to promote socialization outside of structured programming, with the goal of an increased sense of belonging among students. Additionally, four RAs stay in the same residence hall and serve as peer mentors to the Summer Scholar participants throughout the program, often providing additional, unstructured social opportunities such as group outings on campus or activities such as sports, crafting, and games.

Coursework

Traditionally, many summer bridge programs incorporate a common course, often a preparatory math course [1, 12,13]. In these models, all students enrolled in the particular math course are program participants. The Summer Scholars model significantly differs from traditional summer bridge programs, as Summer Scholars participants are given the option to enroll in any non-online course offered at the Large Midwestern Univeristy during the eight-week program. Classes that they select may or may not include other Summer Scholars participants.

Commonly, engineering summer bridge programs are either required or encouraged for individuals to 'catch-up' in a particular subject in preparation for the demands of university coursework (Walpole et al., 2008). Summer Scholars does not employ language, messaging, or invitations based on this idea as it might suggest to a student that they are not prepared to be a successful engineering student. Unlike traditional summer bridge programs, Summer Scholars is framed as an opportunity to get ahead on coursework and become acclimated to campus to lessen the intensity of the first semester. In addition to the standard university course, Summer Scholar participants are required to register for one of three cohort-based courses, which are intentionally incorporated to explore the non-academic side of the engineering discipline and to diversify their experience. In these courses, participants engage in topics such as engineering professionalism, engineering research, and interdisciplinary engineering projects.

Methods

This research is the pilot phase of a larger project aiming to understand the impact of summer programming on student success, including: (1) grade point average, (2) retention, (3) pathway changes, and (4) sense of belonging. While summer bridge program success is generally measured via GPA and retention, due to the goals of Summer Scholars, we aim to measure qualitative attributes to understand the potential holistic student development. The combination of quantitative and qualitative data will provide a broader understanding and insight into the impacts of Summer Scholars on the participants.

Quantitative Analysis

First fall semester GPA data were obtained for all incoming first-year students in the College of Engineering, including Summer Scholar participants, for the 2016, 2017, and 2018 cohorts (total n = 5,092). An independent-samples t-test was conducted to compare Summer Scholars' first semester GPA and COE cohort GPAs for each of the three years. GPA comparisons between Summer Scholar cohorts and the respective College of Engineering cohort are found in Table 2.

Qualitative Analysis

We collected data from three cohorts of this program through campus tools reporting students' department, current GPA, demographics, and others. We used those reports to create a purposeful sample of maximum variation for qualitative interviews with seven students from Summer Scholars 2018. After obtaining IRB approval, the Program Director of Summer Scholars reached out to those students to schedule an interview with a student researcher. A student researcher and co-author conducted 90-minute, in-depth semi-structured interviews with these students to understand their experience in Summer Scholars and at the University since completion of the program. Interviews were recorded, transcribed, and analyzed using thematic analysis. This pilot includes the analysis of three transcripts that were selected for maximum variation in experiences. All three students were women, with two identifying as ethnic minorities.

Preliminary Results

Quantitative Results

Semester GPA was averaged across the Summer Scholars cohort and compared to the average GPA to the College of Engineering cohort, as shown in Table 2.

Table 2. *Average Semester GPA of Summer Scholar Participants and College of Engineering cohorts.*

Cohort	Semester	Average Semester GPA (4.0 Scale)		
		Summer Scholars Participants	***College of Engineering***	***p***
2016	Fall 2016	3.18	3.37	0.092
2017	Fall 2017	3.09	3.34	0.063
2018	Fall 2018	3.17	3.34	0.078

Average GPA shows that Summer Scholars Participants earned lower GPAs than the average student in the College of Engineering. However, there was not a significant difference in the GPAs between Summer Scholars and COE-wide GPA. Independent-samples t-test complete results are included A.1.

Qualitative Results

Key findings and themes from the three interviews are presented first individually to understand the experience of each student more fully.

Jenn: Unwritten Rules of Success

Jenn is an in-state, black woman. Ultimately, she decided to attend Summer Scholars to become acclimated and "adjust" to the campus through meeting people and exposing herself to the campus early. Jenn was offered and attended Summer Scholars on full scholarship and hypothesizes that she would have still attended if she had not been offered the scholarship because her mother would have encouraged her to do so. Throughout the interview, Jenn frequently incorporates the Summer Scholars community and/or her peers in the program when describing her experiences in her courses, residence hall experience, and free time.

Jenn noted that she was "anxious" to move for school, which stemmed from uncertainties about preparing for the move, the format of university courses, and fear of "not knowing what was going on" when she arrived on campus. While one of her goals was to perform well academically, Jenn received a D in her non-cohort elective course (Global History) and shares that she did not attend all of the classes. She described how she enjoyed the class because she was able to meet a "mix of people" as this class had students of multiple programs of study. Upon reflection, she said that she slowly learned from this experience. Jenn recalled that her first official Fall semester "kinda went down at the end" (i.e., she did not perform well academically).

Despite her academic performance, she expressed, "my first year went better because I was in Summer Scholars" and that "one of the most important things [she] gained was a friend group." She said that establishing this friend group was very valuable, as they would encourage her to study with them at the library, even if they were in different classes. Additionally, she stated that the advice for success that she received from peers and RAs, outside of the classroom, was essential throughout her upcoming years as an undergraduate engineering student, especially in her first full semester. Furthermore, she noted that she knew "what was expected," "that college would pick up in pace," and that she "knew" how to meet other students in the dorm because she had "been through the process" and that she "had already done that."

Jenn, currently a fourth-year student, now lives with three friends she met in Summer Scholars. Additionally, Jenn worked as an RA for the program during the Summer of 2019.

Brittany: "De-Stigmatized" College

Brittany is an in-state, black woman. Brittany was offered and attended Summer Scholars on scholarship and postulates that she would not have attended Summer Scholars had she not received the scholarship. Furthermore, she noted that the Summer Scholars scholarship was a factor in her decision to attend the Univeristy because the scholarship "showed [her] that the school wanted [her] enough to offer me [her] something like that."

Prior to attending Summer Scholars, Brittany discussed how her mindset of meeting people in college was similar to developing "a business arrangement," and she said that she "wouldn't really try to make friends" when coming to college. She anticipated that meeting people in college would entail finding a group of people for academic support and was searching for an "ambitious" group which whom she could "reach the finish line [graduation] together." Brittany's "biggest" goal was earning a "good" GPA for her first year of college, and she saw Summer Scholars as an opportunity to provide a "strong start" to her GPA and "start college off

on a good foot." Furthermore, she said that if she had not attended Summer Scholars, she "would not have been as driven" upon arriving for her first full semester.

Twice, Brittany noted feelings of nervousness that were alleviated by recognizing that her peers were feeling similar emotions and through the reassurance and comfort from the RAs. Reflecting on her overall experience, Brittany notes that Summer Scholars "surpassed... expectations" as she did not expect to form close, relationships with other Summer Scholars participants and she did not expect that the program would offer programming outside of academics (e.g., organized crafting nights, study groups, sports). Additionally, she noted that she believes Summer Scholars "de-stigmatize[d]" college for first-year students and how Summer Scholars showed her that attending university can be more than for strictly "academic purposes," which was revealed through the friendships she developed with both other program participants and her RAs.

Alice: "Taking responsibility for your own success."

Alice is an in-state, white woman. In her interview, Alice focused on similar themes as Jenn and Brittany; however, she provided a different perspective on the relationships formed in Summer Scholars. For Alice, the decision to attend Summer Scholars was a "hard decision" because she had a positive high school experience and did not know if she wanted to move away from home the summer before university. However, she decided to attend Summer Scholars because it was "an opportunity that [she] didn't want to pass up." Alice was offered and attended Summer Scholars on scholarship and hypothesizes that she would not have attended if she had not been offered the scholarship. Reflecting on her personal goals for her first year at university, Alice noted that performing well academically, becoming involved in the marching band, and becoming involved in research as specific goals, but summarizes them as "try new things and meet people."

When responding to prompts from the interviewer, Alice often related her answers to her academics. Interactions with other individuals in the courses "surprised" her, as students of higher class standing would ask Summer Scholar students for help. At first, this intimidated her, but "as we moved further along," she realized, "we're all just students trying to take the class and do well." Furthermore, she noted that she was "surprised" by some characteristics of her Chemistry (i.e., non-cohort) course, such as the responsibility a student holds to attend class without policy-based consequences and the "good [class] average" of 60% on the first exam.

Alice described positive interactions with her peers; however, she recalls prioritizing her academics over socialization on occasion. When describing the structured programming of Summer Scholars, she mentioned that "not always a lot of studying happened at them." Furthermore, she stated how she was "surprised" that some of her peers were not taking their classes "seriously." Alice expanded on this, describing that students would do "goofy things," such as sleepovers, the night before an exam. However, despite this prioritization, she states that she "had a couple people [she] was close with, and everyone was nice to each other."

Alice attended pre-season marching band camp before her first fall semester, after the conclusion of Summer Scholars, and notes that band was the activity that helped her meet the

largest number of friends. Upon reflection of her first year in university, she says that she does not "spend every minute of every day with Summer Scholars [students]," but she is "still in touch, and it's a good connection to have."

Discussion

Quantitative results revealed that there is not a statistically significant difference between Summer Scholars participants and the respective COE cohorts' first semester GPAs. Previous studies have reported that underrepresented students, such as those in Summer Scholars, tend to score lower GPAs their first semester as compared to their peers [5, 14]. Summer Scholars might be a first step to address obstacles that some underrepresented students face in their first year at university, suggesting an educational value in attending Summer Scholars. Furthermore, the lack of statistical significance in the first-semester GPA between Summer Scholars and the respective College of Engineering cohort further suggests that these underrepresented students are as likely to graduate as their COE peers [5].

Qualitative analysis findings include three themes that became apparent through student interviews when asked to discuss the value of and what they gained from participating in Summer Scholars. The themes we identified were: (1) *shared experience*, (2) *unwritten rules for success*, and (3) *getting a head start*.

Theme 1: Shared Experience

From the interviews described above, we notice that all students explicitly discuss the socialization component of Summer Scholars concerning forming both close relationships and acquaintances through the program. While Jenn noted that she formed many close friendships, Brittany described friends that she would meet up with "once a semester," Alice is "in touch" with some previous participants, all three students provided a hypothetical antidote of the comforting or "nice" feeling that would come from running into and waving at one of their cohort members walking to class. Furthermore, despite the varying degrees of "closeness" they might be with their cohort, all three students note that they felt more comfortable and more confident coming back to campus for their first full semester because they felt that they already had a community waiting for them back on campus. Alice explicitly calls out the value of this comfort when she expresses that she felt comfort in knowing that if for some reason, she was unable to make any friends during her first semester, she knew that she had a group of individuals that she was already connected with. These statements elude to the students feel that they had a community at the institution, regardless of how strong the relationships between individuals might be as a result of their shared experience together, which suggests that participating in Summer Scholars resulted in an increased sense of belonging due to the connections formed through the program.

We intentionally incorporated Alice's interview in this analysis, as she provides a counter-story to Jenn and Brittney. While she does mention that she formed lasting, close friendships during Summer Scholars, she prioritizes academics during her responses and notes that she formed the majority of her friends in the band. We include this to show that it is not expected, and we do not intend to suggest that every student will form lasting relationships through their participation in Summer Scholars. Summer Scholars is designed to promote socialization to promote a sense of belonging by fostering an environment where students can

interact with other students in their program, which, again, is correlated with as little as one connection with another individual at the institution.

Theme 2: Unwritten Rules for Success

All students, especially Jenn, note lessons that they learned from their peers, RAs, and general participation in the program that made them more comfortable and eased their transition into their first full semester on campus. We refer to these as *unwritten rules of success*. These three students discussed realizing these learnings upon their return to campus for the fall semester. They specifically stated things relating to understanding the structure of college coursework, class expectations, how to navigate campus, and how to get involved in campus clubs or organizations. While some university instructors may discuss what is expected in their class concerning their coursework, the Summer Scholars noted benefitting from study skills, habits, and practices that their RAs were able to share as a product of their trial and error experiences. This extended beyond the classroom, as the Summer Scholar participants were able to learn about the successes and failures that their RAs might have experienced and learned those lessons as well. As Alice stated, when she arrived on campus, she "knew what she was doing," which suggests increased confidence with respect to navigating the new campus culture that was a product of the non-academic, peer mentoring component of Summer Scholars.

Theme 3: Getting a Head Start

None of the interviewees stated that they were using Summer Scholars as an opportunity to catch-up academically. As seen in the qualitative analysis, neither Jenn, Brittany, nor Alice expressed concern that they would not be ready for the academic rigor of engineering and did not take classes with a goal of remediation. Brittany noted that she took Calculus I during Summer Scholars, despite taking that course in high school, however, she expressed that her motivation was to create a "strong start" to her GPA and "start off college on a good foot" which does not elude to concern about unpreparedness.

As previously discussed, when advertising Summer Scholars, it is not framed as an opportunity to take remedial coursework but rather is discussed as a chance to increase their academic status. This might be why Summer Scholars participants embrace the idea of getting a "head start" on their engineering curriculum and choose to enroll in a chemistry or calculus course; however, past Summer Scholars students have enrolled in courses to fulfill general education requirements with non-engineering classes (e.g., Global History or Creativity, Innovation, and Vision).

Limitations

Findings from this mixed-methods analysis provide insight into how summer bridge programs focused on holistic student development might promote student success. It is important to address the inherent limitations of this study. Due to the small sample size of interview participants, generalizations of these findings should not be across larger groups of students sharing similar identities.

Implications

Findings from this pilot study have implications for university administrators and program directors. Explicitly stated by Brittany, the social activities (i.e., everything outside of

the classroom experience) "surpassed" her original expectations of Summer Scholars. Summer Scholars utilized many inexpensive activities such as sports, free university programming (e.g., student union outdoor movie nights, public concerts), and game nights to develop the bulk of their social programming. Furthermore, many of these activities were organized by the RAs as the program progressed, and the RAs identified the Summer Scholars participants' interests. Social programming has a large potential impact at a low financial investment. While Summer Scholars is not focused on remedial coursework, summer bridge programs with remedial coursework could be expanded to include a socialization element at a low time and effort cost.

From a recruitment perspective, Brittany's discussion of her decision-making process is of note. While students must commit to attending the University before attending Summer Scholars, they might receive a Summer Scholars invitation and scholarship before committing to the institution. Brittney explicitly cited the Summer Scholars program scholarship as a factor in her college choice process, providing one successful case for the use of Summer Scholars as a recruitment tool for the College of Engineering.

Conclusions & Future Work

This study examines the potential impact of a focused summer program on a sense of belonging and success in underrepresented students. Findings from this research can be used at other institutions aiming to develop or to reframe STEM summer programs to encourage positive student outcomes in holistic student development, GPA, and retention. In particular, the three themes of a *shared experience*, learning the *unwritten rules of success*, and *getting a head start* on the university experience are important to our pilot of student participants. Future work will expand the analysis to a greater number of participants to better understand the prevalence and importance of these themes and others.

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Appendix

A.1. Independent Samples T-Test Results (GPA)

FA16: $t(1630) = -1.687$, $p = 0.092$

SP17: $t(1611) = -1.425$, $p = 0.154$

FA17: $t(1731) = -1.860$, $p = 0.063$

SP18: $t(1699) = -2.735$, $p = 0.006$

FA18: $t(1731) = -1.763$, $p = 0.078$