



# The Appropriateness and Effectiveness of Cross-aged Peer Mentoring in the Learning Environment

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**Abstract:** This four-year study seeks to identify and analyze the impact of a cross-aged peer mentoring program. The research addresses mentoring in business education and involves the use of undergraduate business students as mentors and role models for participating high school students. Through collaboration with local high schools and the National Foundation for Teaching Entrepreneurship, a Midwest University sponsored a series of workshops in which high school students were mentored by undergraduate business students. Over a span of four years 167 high school students and 167 college students participated in these workshops. Data was collected from the peer-mentoring program participants and analyzed to determine the appropriateness and effectiveness of cross-aged peer mentoring in the field of business education. It was observed that mentoring increased high school students perceived level of future success in college, the perceived effectiveness of their business plan, and their level of comfort on a college campus. The data showed that students that had one or more family members that attended college had higher levels of perceived success in college, felt more confident in the effectiveness of their business plan, and experienced a higher level of comfort on a college campus at the start of the mentoring program as compared to students that did not have immediate family members that attended college. This research not only adds to the mentorship literature but may also be useful in allocating resources to schools that have a greater demographic of first-generation college students.

**Keywords:** Peer mentoring, mentorship programs, mentoring efficacy, mentors

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## INTRODUCTION

Keeping students on the path to high school graduation and college enrollment remains a legitimate concern in education (Hall & Jaugietis, 2010). There is a significant amount of research that identifies student engagement and interpersonal relationships in student achievement and motivation as predictors of high school graduation (Fredricks, Blumenfeld, & Paris, 2004; Goodenow, 1993). This has resulted in increased attention and the creation of more personalized learning environments that emphasize teacher-student relationships, as well as high quality instruction (H. Bloom, Thompson, & Unterman, 2010; H. S. Bloom & Unterman, 2013).

The connection between student academic performance and delivery of mentoring remains vital as mentoring increases student engagement and provides opportunity for interpersonal relationships between mentors and mentees. Research has reported positive effects of mentoring programs on academic outcomes (DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011; Kongmanus, 2016). The value of mentorship has garnered considerable attention in the educational literature.

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However, most of the literature refers to the traditional teacher-student relationship in mentoring within academics. There is a minimal amount of literature highlighting the dynamics of peer mentoring and even fewer studies that address cross-aged peer mentoring.

This study looks at the impact of a cross-aged peer-mentoring program in business education consisting of upper-class undergraduate business students, as mentors, and participating upper-class high school students, as mentees. Four years of data from participant surveys has been collected and analyzed. Through collaboration with local high schools and the National Foundation for Teaching Entrepreneurship, a small Midwest university sponsored a series of workshops in which high school students were mentored by undergraduate business students. Both low-income and mid-income high schools were included. Over four years 167 high school students and 167 college students participated in these workshops. Data was collected from the participants and analyzed to determine the appropriateness and effectiveness of cross-aged peer mentoring in the field of business education. The findings of this study add to the mentoring literature through the exploration and application of cross-aged peer mentoring programs in business education.

## **LITERATURE REVIEW**

According to [Hall and Jaugietis \(2010\)](#), there is a wide array of components that can be incorporated into the structure of a peer mentoring program and identifying these components is crucial to the development of a successful program. Several approaches for mentoring are identified in the literature including “Involvement in Learning” ([Astin, 1984](#)), “Academic and Social Integration” ([Tinto, 1975, 1993](#)) and the “Social Support” approach ([Pearson, 1990](#)). Since the focus of this study is cross-aged peer mentoring the “Academic and Social Integration” approach is used as a basis for exploration ([Tinto, 1975, 1993](#)). Of these approaches, the “Academic and Social Integration” appears to be most appropriate for peer mentoring programs that focus both on academics and engagement. Integration refers to the extent which students identify with the school and/or department in which they are enrolled. Social support refers to the establishment of social networks among other students and emotional support from peers and staff. Peer assisted instruction has been found to be helpful to students, particularly in highly structured programs like business, mathematics, and science ([Adora, 2017](#); [Arendale, 2007](#); [Hock-Eam & Yeok, 2017](#)). In humanities and social science programs the diversity of studies taken by students is so great that finding a common set of skills on which to base an instructional program is difficult. In addition, a portion of mentoring programs components maybe be fixed due to the administrative arrangements established by an institution while others, particularly those involving content, can vary and be determined by program managers or by mentors themselves. It is these components that can be modified to bring about improvements to the delivery of a program.

## **RESEARCH METHODOLOGY**

The mentoring workshops were used to explore the high school students’ plans to attend college, the importance they put on a college degree, their comfort level on a college campus and their perceived chances of success in college as well as their perceived improvement in the quality and effectiveness of their business plans. The study included 167 high school students and 167 college students who participated in a series of workshops conducted over a four year span. There were two high schools that participated in the study and one university. The high schools were chosen based on income level and college readiness. One lower income high school and one mid-income high school were chosen. Since family income has been used to establish eligibility for free/reduced price lunch, the school district’s National School Lunch Program (NSLP) Eligibility Percentage was used as a proxy for income. According to the NSLP 85% of students qualify for the free lunch program at the low-income school and 51% of students qualify at the mid-income school with the state average being 52%. The high schools were also chosen based on their college readiness. The college readiness score is calculated based on the percentage of graduating seniors who achieved a combined score of at least 21 on any ACT assessment taken prior to graduating, and therefore are classified as being “Ready for College Coursework”. According to the State Report Card, the data identifies students at the low-income school scored a college readiness score of 9% versus the mid-income school which scored a college readiness score of 45%, with the state average being 51%.

The high school students included in the study were students who registered for the entrepreneurship course as an elective. The college students were chosen based on those who registered for a business course in service leadership. Both the high school and college students were upperclassmen. The study was a structured program in which the

high school students were transported to the university for the workshops. The mentors and mentees were randomly paired together. The mentees worked with their mentors on their business plans based on an outline provided by NFTE. The mentees and mentors were also served lunch and ate together providing time for general conversation. The duration of each mentor program was one semester during which the mentees met face-to-face with their mentors during workshops. No email communication was allowed. The mentees were paired with the same mentor for each subsequent workshop session. The mentor training, provided by the business leadership course professor, consisted of going over the business plan template provided by NFTE that would be used by the high school students. The college students were told that they could discuss their college experience with the high schoolers but were provided explicit instructions not to exchange emails or phone numbers with the high school students. The mentors were not paid for their service, but they were given class credit for participating in the program. An identical survey was administered to the high school students both at the beginning of the program and at the end of the program. The survey explored the effect of mentoring on the high school students perceived levels of future success in college, the effectiveness of the students' business plans and the students' level of comfort on a college campus.

**H1:** An association exists between whether a high school student's family attended college and the high school students plan for attending college.

Students were asked if they had a family member attend college (yes/no). Students were also asked to indicate the level of post-secondary education they intend to complete. This question had four mutually exclusive response choices: no school, trade school, 2-year college and 4-year college. Based on the response of students as to their choice of post-secondary education we define two dichotomous variables which is the students plan for attending college (yes/no).

Some students might believe that attending a 2-year college (associates level institution) fulfills the standard of having attended college. Other students might believe that only attending a 4-year college (bachelors level institution) qualifies as attending college. Since differences in the definition could lead to differences in significance and strength of an association between whether one's family attended college and the high school student's plan for attending college, two possible definitions of college are employed and analyzed separately.

Definition 1: A 2-year college is defined as the minimum standard of having attended college. Any student that indicates they plan to attend either a 2-year college or 4-year college is counted as one that has a plan to attend college.

Definition 2: A 4-year college is defined as the minimum standard of having attended college. Only students that indicate they plan to attend a 4-year college are counted as those that have a plan to attend college.

Using Definition 1, the cross-tabulation between whether a student's family attended college, and the students plan on attending college is presented in Table 1. Odds in favor of a student planning to attend college given that the student has a family member who attended college is 61:1. The odds in favor of a student planning to attend college given that the student does not have a family member who attended college is 84:21. The odds in favor of a student planning to attend college is 15.250 times greater for students with a family that has one or more members who attended college than students that have no family members who have attended college: 95% CI of odds ratio = [1.997, 116.464]. The association between a student's plan to attend college and whether the student had family that attended college is significant:  $\chi^2 (df = 1) = 11.522, p = 0.001$ . The effect size of this association is moderate:  $\phi = 0.263, p < 0.001$ .

Table 1 *Cross Tabulation of Subject's Plan to Attend College and Whether Subject has One or More Family Members that Attended College Assuming Both 2-Year and 4-Year Colleges are Defined as College*

		Does the subject plan on attending college?		Total
		Yes	No	
Does the subject have one or more family members that attended college?	Yes	61	1	62
	No	84	21	105
	Total	145	22	167

Using Definition 2 only students who have indicated a plan to attend a 4-year college are counted as those that have a plan to attend college. Table 2 displays the cross-tabulated results of the student's plan to attend college and

whether the student has family who has attended college per this definition. The odds in favor of a student planning to attend college given that the student has a family member who attended college is 49:13, while the odds in favor of a student planning to attend college given that the student does not have any family who attended college is 30:75. The odds in favor of attending college is 9.423 times greater for students with a family member that attended college versus students that do not have family who attended college: 95% CI of odds ratio = [4.479, 19.824]. The association between a student's plan to attend college and whether the student has family that attended college is significant:  $\chi^2$  ( $df = 1$ ) = 39.820,  $p < 0.001$ , with moderate-strong effect size  $\phi = 0.488$ ,  $p < 0.001$ . When the definition of college education is restricted to 4-year colleges, the strength of the association increases, with a more precise odds ratio in favor of attending college.

Table 2 *Cross Tabulation Of Subject's Plan to Attend College and Whether Subject has One or More Family Members that Attended College Assuming Both 2-Year and 4-Year Colleges are Defined as College*

		Does the subject plan on attending college?		Total
		Yes	No	
Does the subject have one or more family members that attended college?	Yes	49	13	62
	No	30	75	105
	Total	79	88	167

**H2:** An association exists between whether the students family attended college, the importance the student places on attending college, their current GPA and type of high school attended by the student.

The point biserial correlation between GPA and family (0 = No family members attended college, 1 = One or more family members attended college) is 0.435,  $p < 0.001$ . A higher GPA is correlated with students that have family who attended college. However, GPA might be correlated with the type of high school the student attends, whether it is a low-income high school or a mid-income high school. The point-biserial correlation between GPA and type of high school student attends was found to be 0.177,  $p = 0.022$ . Students from mid-income high schools demonstrate higher GPA than students from low-income high schools, but this association is comparatively weaker than the correlation between GPA and family. When the partial correlation between GPA and type of high school the student attends is computed controlling for family, the partial correlation is 0.022,  $p = 0.777$ . There is no correlation between GPA and type of high school student attends after controlling for the effect of family. When the partial correlation between GPA and family was computed controlling for type of high school the student attends, the partial correlation was 0.405, which is still significant,  $p < 0.001$ , with about the same strength of association as the zero-order correlation between GPA and family which was 0.435. It appears that whether family members attended college explains the relationship between GPA and the type of high school the student attends.

The biserial correlation between student's GPA and the importance of college education ranked by the student (on 5-point ordinal scale ranging from 1-5) is 0.454,  $p < 0.001$ . Students that provided a higher rank to the importance of college education generally have shown higher GPA than students who provide low importance to a college education. A similarly strong correlation is observed between importance of college education and whether the student has family who attended college, with a rank correlation of 0.581,  $p < 0.001$ . Controlling for the type of family, the partial correlation between a student's GPA and importance of college education is 0.284,  $p < 0.001$ . The partial correlation between GPA and importance of college when controlling for family is lower than the zero-order correlation between GPA and importance of college (0.284 vs 0.454 respectively). This possibly points to a mediating effect of family on GPA and importance a student places on a college education.

**H3:** Mentoring has a multivariate effect on students' perceived success in college, effectiveness of business plan and degree of comfort on a college campus, with students' family and type of high school as moderating variables.

A multivariate repeated measures ANOVA model was used to determine the effect of mentoring on the student's perceived ability to succeed in college, student's perceived effectiveness of their business plan, and students perceived comfort on a college campus. Between-subject factors included into the model were family: whether the student has one or more family members who attended college (yes or no); and school: whether the student attends a low or

mid-income high school. The responses were perceived future college success, business plan effectiveness and comfort on a college campus measured on a 100-point scale before and after the mentoring program. The multivariate test shows a significant within subject effect of mentoring: Pillai's trace = 0.496,  $F(3.161) = 52.737$ ,  $p < 0.001$ . There is no significant interaction between mentoring and type of high school: Pillai's trace = 0.047,  $F(3.161) = 2.645$ ,  $p = 0.051$ , but a significant interaction between mentoring and family was detected: Pillai's trace = 0.129,  $F(3.161) = 7.914$ ,  $p < 0.001$ . The three-way within subjects interaction between mentoring, type of high school and student's family was not significant: Pillai's trace = 0.021,  $F(3.161) = 1.157$ ,  $p = 0.328$ . The between subject effect of family was significant: Pillai's trace = 0.360,  $F(3.161) = 30.224$ ,  $p < 0.001$ , while the between subject effect of school was not significant: Pillai's trace = 0.011,  $F(3.161) = 0.570$ ,  $p = 0.636$ . Between subject interaction between type of high school and family was not significant. Multivariate analysis of variance tests is presented in Table 3.

Table 3 *Multivariate Analysis of Variance for Overall Model*

Effect	Pillai's Trace	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>p</i> -value
<b>Between Subjects</b>					
School	0.011	0.570	3	161	0.636
Family	0.360	30.224	3	161	<0.001
School*Family	0.016	0.853	3	161	0.467
<b>Within Subjects</b>					
Mentoring	0.496	52.737	3	161	<0.001
Mentoring*School	0.047	2.645	3	161	0.051
Mentoring*Family	0.129	7.914	3	161	<0.001
Mentoring*School*Family	0.021	1.157	3	161	0.328

**H3a:** An effect of mentoring exists on students' perceived ability to succeed in college, with differences between students that have family that attended college and students that did not have family that attended college.

The means plot in Figure 1 shows that while students' perceived success in college increased after mentoring, the increase was significantly greater for students that did not have family members who attended college than for students that had family members who did attend college. Univariate within-subject test indicates a significant effect of mentoring on student's perceived college success:  $F(1.163) = 73.603$ ,  $p < 0.001$ . A significant interaction was present between mentoring and family:  $F(1.163) = 20.479$ ,  $p < 0.001$ . The between subject factor of family was significant:  $F(1.163) = 29.967$ ,  $p < 0.001$ . The univariate tests for perceived college success are presented in Table 4. The mean pre- to post-mentoring increase in perceived college success for students who did not have family attend college was 10.200 points, 95% CI = [8.372, 12.028]. The mean increase in perceived college success for students that had family members attend college was 3.155 points, 95% CI = [0.684, 5.626]. The between subject effect of family, shows up as a gap in perceived success between students that had family members attend college, versus those students that did not have family members attend college. Due to the greater improvement in success scores post-mentoring for students that did not have family who attended college relative to students that have family who attended college, the gap in perceived college success due to the effect of family was reduced through mentoring.

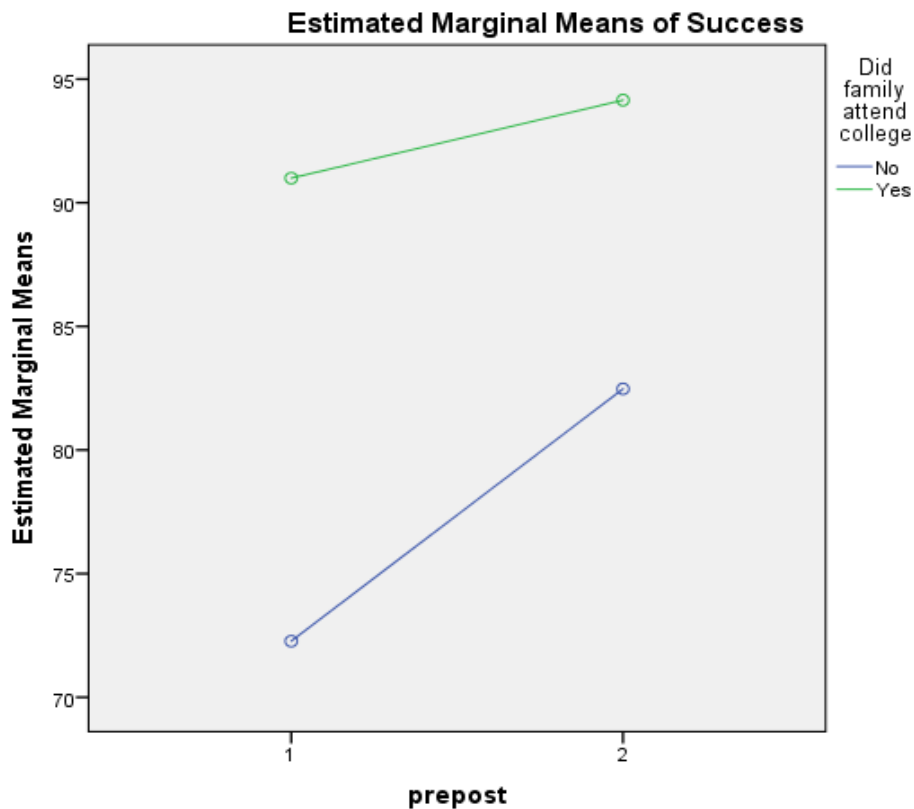


Figure 1 Means Plot for Subject's Perceived Success in College

Table 4 Multivariate Analysis of Variance for Overall Model

Effect	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>p</i> -value
<b>Between Subjects</b>				
Family	29.967	1	163	<0.001
<b>Within Subjects</b>				
Mentoring	73.603	1	163	<0.001
Mentoring*Family	20.479	1	163	<0.001

**H3b:** An effect of mentoring exists on students' perceived effectiveness of their business plan with a moderating effect of whether students have family that attended college.

Univariate tests for Effectiveness (Table 5) indicates a significant within subject effect of mentoring on business plan effectiveness:  $F(1.163) = 145.558, p < 0.001$ . Interaction between mentoring and family was not significant:  $F(1.163) = 0.656, p = 0.419$ . The between subject factor of family was significant:  $F(1.163) = 47.409, p < 0.001$  which indicates that a significant gap exists between the perceived business plan effectiveness of students that have family that attended college versus students that do not have family that attended college. These tests are consistent with the means plot in Figure 2, which shows that student's perceived effectiveness increased after mentoring, that the increase was approximately equal for students with family who attended college and for students whose family did not attend college. The gap in business plan effectiveness between students that have family who attended college and students that do not have family that attended college was relatively constant, pre- to post-mentoring. The mean increase in business plan effectiveness after mentoring was 7.818 points, 95% CI = [6.538, 9.097].

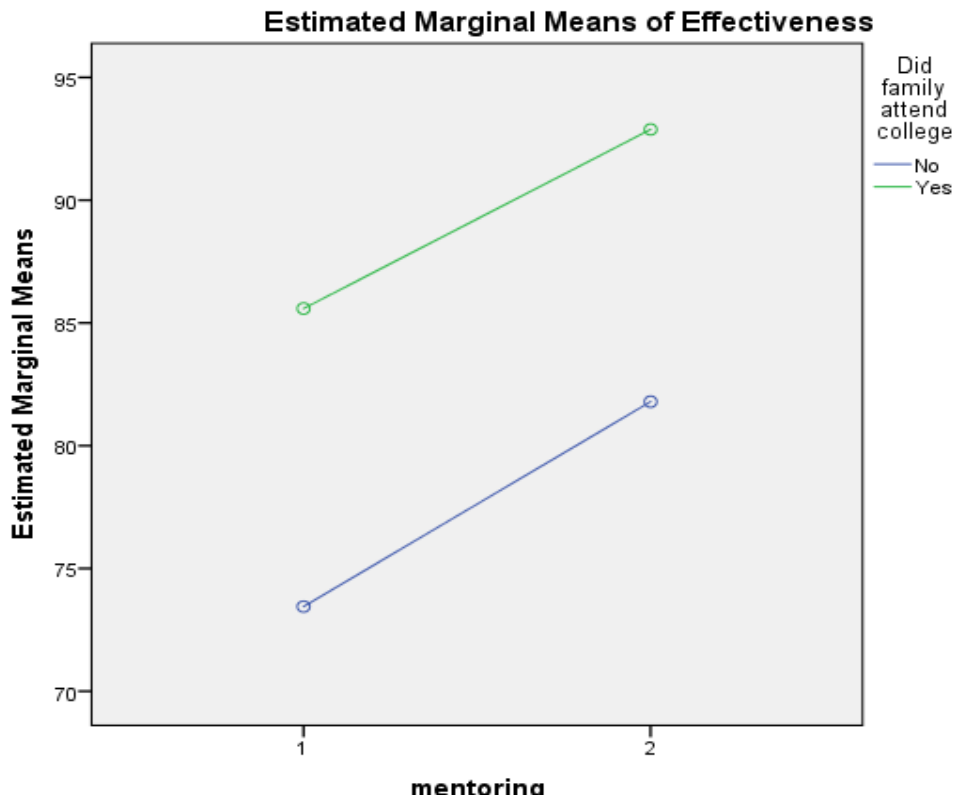


Figure 2 Means Plot for Subject's Perceived Effectiveness of Business Plan

Table 5 Univariate Test for Subject's Perceived Effectiveness of Business Plan

Effect	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>p</i> -value
<b>Between Subjects</b>				
Family	47.409	1	163	<0.001
<b>Within Subjects</b>				
Mentoring	145.558	1	163	<0.001
Mentoring*Family	0.656	1	163	0.419

**H3c:** There is an effect of mentoring on the level of comfort experienced by students on a college campus, with a moderating effect of whether students have family that attended college.

Univariate within-subject test indicates a significant effect of mentoring on student's level of comfort on college campus:  $F(1,163) = 52.183, p < 0.001$ . There was a significant interaction present between mentoring and family:  $F(1,163) = 11.436, p = 0.001$ . The between subject effect of family was significant:  $F(1,163) = 75.044, p < 0.001$ . Test results in Table 6 are consistent with the means plot in Figure 2, which shows that while students with family who attended college saw an increase in their comfort level on a college campus, that increase was not as large as the increase in comfort experienced by students whose family did not attend college. The between subject effect of family shows up as a gap in the comfort level on a college campus: students that have family that attended college report higher levels of comfort on a college campus relative to students whose family did not attend college. The mean increase in the level of comfort on college campus was 6.214 points for students whose family did not attend college, 95% CI = [4.838, 7.591]. The mean increase in comfort on a college campus was 2.251 points for students that have family who attended college, 95% CI = [0.391, 4.111].



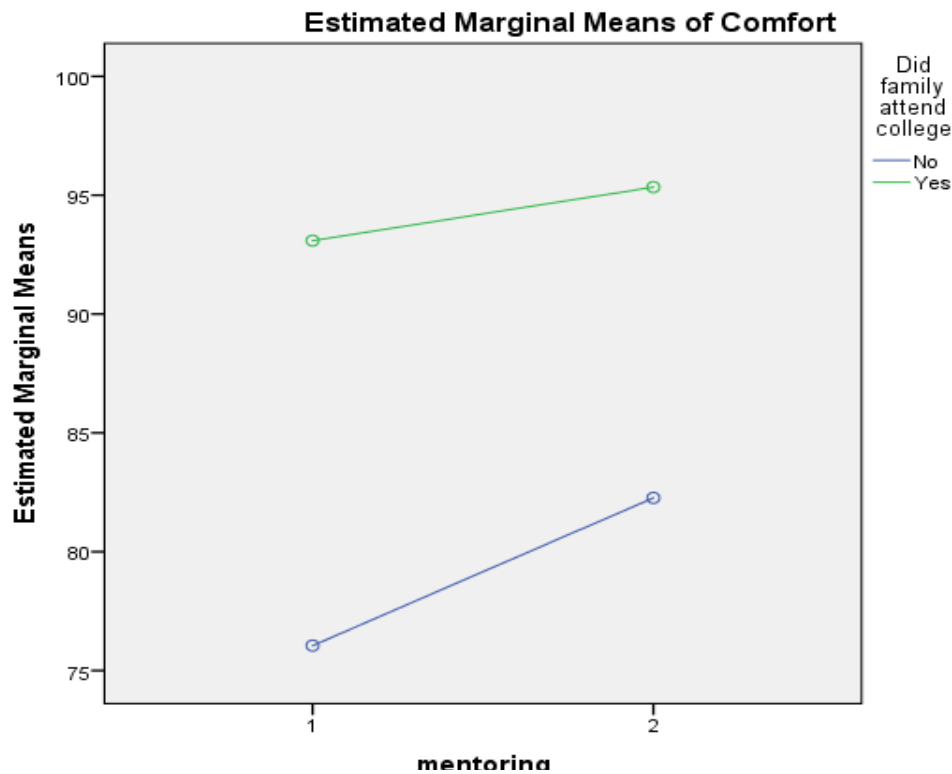


Figure 3 Means Plot for Subject's Perceived Comfort on College Campus

Table 6 Univariate Test for Subject's Perceived Comfort on a College Campus

Effect	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>p</i> -value
<b>Between Subjects</b>				
Family	75.044	1	163	<0.001
<b>Within Subjects</b>				
Mentoring	52.183	1	163	<0.001
Mentoring*Family	11.436	1	163	0.001

## DISCUSSION

The peer mentoring program in this study has some structural components based on the partnership between the National Foundation for Teaching Entrepreneurship (NFTE), the high schools and the university. According to NFTE, its mission is to inspire young people from urban communities to stay in school, recognize business opportunities, and plan for successful futures. NFTE does this through partnering with urban high schools and providing the schools with teacher training and the resources necessary to offer entrepreneurship courses. Students who take these entrepreneurship courses are taught business strategy and are required to design a business plan for a business that the student could realistically start. The students then compete against each other, as well as other schools by presenting their business plans to a panel of business experts. The winners receive seed money for their businesses and money for college. The students that have participated in a NFTE program have exhibited higher graduation rates as compared to students in their respective schools' who had not participated in an NFTE program (Beary, 2013). The third partner in this mentorship program is a Midwest university. The university partnered with NFTE to add another dimension to the high school students experience. The NFTE high school students were mentored by upperclassman students from the college of business. The program was built into an upper level business course as a community learning project for the college students. The college students mentored the high school students and worked with them on their individual business plans. The high school students were brought to campus several times during the academic semester to meet



with their mentors and work on their business plans.

## CONCLUSION AND IMPLICATIONS

Students who have family that attended college were more likely to have a plan to attend college for both the 2-year college definition and the 4-year college definition. Using the 2-year definition, students who have family that attended college have odds in favor of planning to attend college that is 15.250 times greater than students that do not have family that attended college. Using the 4-year definition, the odds in favor of having a plan to attend college is 9.423 times greater for students who have family that attended college than students that do not have family that attended college. Families that have attended college also exerted a positive influence on GPA, and a positive influence on the importance of a college education. Students with a higher GPA put greater importance on the value of a college education and plan to attend college at greater rates than students with a lower GPA. There was no correlation between GPA and type of high school a student attends after controlling for family. Family appears to be the primary driver on a student's plans for college, GPA and importance of college. There was no interaction between the low and mid-income high schools and the mentoring program. Students from either type of high school appeared to benefit from the mentoring program. However, there was an interaction between the type of family and the mentoring program. At the start of the program, students that had family that attended college had higher mean scores in their perceived future success in college, effectiveness of their business plan, and their level of comfort on a college campus. Students who did not have family members that attended college benefited more from the mentoring program than students whose family members attended college with a greater increase in their perceived ability to succeed in college and a greater increase in their level of comfort on a college campus. While students from all groups benefited from mentoring, the cross-aged peer mentoring program was shown to reduce the gap between students who had family members who attended college and those that did not have family members attend college on their level of confidence in their success in college and their level of comfort experienced on college campus. In terms of students' confidence in their effectiveness in developing a business plan, students from both groups of families benefited at approximately the same rate. This research not only adds to the mentorship literature but may also be useful in allocating resources to schools that have a greater demographic of first generation college students.

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