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RESEARCH ARTICLE

A Case Study: An Investigation of the High School Experience and College Performance Using Interviews and Latent Growth Curve Modeling

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For over 120 years, high school reform has been at the forefront of American education in an effort to improve postsecondary performance of college students. Many studies have examined academic measures that predict the likelihood of success students may experience as a function of high school performance, but, overwhelmingly, these predictions focus on the first year of post-secondary learning. Few studies have investigated from the students' perspectives what conditions in high school may have contributed to their initial and long-term success in college. The authors interviewed college students who graduated from an early college high school while either in college or immediately after graduating, and then used linear growth curve modeling to examine how well these and other students performed academically. The researchers found that 1) early college high school students showed a slightly slower decline in academic performance as compared to non-early college high school students and 2) some aspects of the high school experience were seen as contributing factors to a successful college career.

Keywords: high school reform; college readiness; longitudinal

High school reform in the United States has a long and varied past in terms of how high schools should be reformed and their purpose (Conant, 1959, Hammack, 2001, Rosenbaum, 2002). Reforming high schools has been a focus for over 100 years; the degree of success has been mediocre and the purpose of high schools remains debatable (States Department of Education, 2004). A cursory search will provide a reformer with a multitude of models, many of which have extensive support networks, training, and possible financial means to assist in implementing such programs (National High School Center, 2007. Concurrently higher education programs are being challenged to reform and improve access to students as well as student degree attainment (Spelling, 2006). In addition to these reforms, state education agencies are redefining school accountability systems to focus on college readiness (NCDPI, 2012). While these efforts have 1) presented students with more rigorous high school programs, 2) challenged educators to rethink student-teacher relationships, and 3) bridge the gap between K-12 and higher education, little is

known about how the students perceive their experiences in these new settings and if these new schools have effects on the post-secondary achievement of their graduates.

This study looks at the experiences of one group of high school graduates of the Early College High School Initiative, which was developed as part of the North Carolina New Schools Project with a grant from the Bill and Melinda Gates Foundation (JFF, 2010, 2011). The Early College High School Initiative is designed to improve the post secondary participation of traditionally under-represented students, or individuals who do not participate in post secondary education at a rate commensurate with their status in society. As first generation college attendees, these students typically are of color, specifically African American or Latino/Latina, and low socioeconomic status.

PURPOSE AND OBJECTIVES

This mixed methods study examines how a group of early college completers (ECHS) performed while attending a Historically Black College and University (HBCU) in North Carolina from 2010 until 2014 either as a fully matriculated college student or a college drop-out. A similar group of traditional high school students was used to compare performance on college GPA. Members of the group of early college students included in the GPA analysis were interviewed using a grounded theory approach to determine what factors of the ECHS experience were perceived as supportive of their success. For the interview students, they attended the same college where they earned college credit while in high school. In particular, the research questions that guided this study were as follows:

1. Does academic performance change once early college students matriculate into college?
2. What attributes of the ECHS experiences were perceived by graduates as supportive of success in college?

REVIEW OF RELATED LITERATURE

As previously discussed, a cursory search of literature reveals that several studies have established the positive impact of early college high schools. Given that the early college concept is a recent addition to secondary education, the search revealed scholarly, peer-reviewed articles that were written between 2003 and 2014. The articles varied in terms of consideration of geographic location of the early college high schools. Furthering that, the research primarily focuses on the effect of early college high schools on minority students, specifically African Americans and Latinos.

Student Academic Outcomes

The ECHS model has been studied to determine if various academic related outcomes for ECHS students differ than those for similar high school students. The studies consistently reveal that ECHS students perform at least as well if not superior to traditional high school students. In an

experimental study, Edmunds et al. (2012) using North Carolina student data, found that ECHS students are taking significantly greater number of college preparatory courses with high degrees of success and these same students demonstrate higher attendance and achieve more satisfactory disciplinary outcomes. In a related study, Garet, Knudson and Hoshen (2014) found that ECHS students had a greater opportunity to enroll in and graduate from college, earned college degrees at a higher rate as compared to similar students and educational attainment gaps were reduced between advantaged and disadvantaged students. The impact of attending an early college was most pronounced for minority low-income students.

While generally supportive of the ECHS model as one that substantially improves student outcomes, the long-term effects of such models is less clear. In a longitudinal descriptive study, Kim and Barnett (2008) reported that after leaving high school, the average student GPA dropped from 2.63 to 2.48 and it was speculated that once leaving the supportive environment of an ECHS, students were less able to maintain previous academic success. A key component of the ECHS model is that of permitting high school students to enroll in college level courses designed to improve college readiness. The impact of this practice has revealed that students do realize significant benefits both short term and long term. In a study of dual enrollment programs and their effect on low-SES students, An (2012) found that while dual enrollment programs demonstrate little impact on the general student population, low-SES students do demonstrate higher rates of degree attainment. In addition to academic structures that gave been reported to support ECHS student success, Kaniuka and Vickers (2010) discuss that affectively, students at these schools view the school environment as most powerful. Students reported that key relationships with faculty and administrators provided the needed social supports that were most often missing at traditional high schools. Such that of all the components of the ECHS model (see Table 1) students felt that relationships were the difference that determined whether they would be successful in high school and eventually transition into college. While clearly effective in improving high school student academic performance and modestly related to longer term effects, understanding how students perceive the lasting effects of the ECHS is less understood.

Transitions to College

The study of transitions from high school to college have begun to listen to the voices of students to better understand what aspects of pre-college and college preparation supported their success in college. A study by Engle, Bermeo, and O'Brien, (2006) used a focus group comprised of 135 first generation students in Texas. Three key findings were reported: 1) raising aspirations for college, 2) helping navigate the college admissions process, and 3) easing the initial transition to college. Students reported that they were generally averse to the idea of attending college for they routinely did not feel they were college material both lacking the necessary academic skills and financial wherewithal to attend. The lack of adequate academic preparation was central to the fears and negative aspirations these students held. Many spoke to the fact that their schools were not equipped to challenge them academically and did not foster the relationships needed to inspire them to succeed. Also they spoke of not being aware of the long-term benefits of attending college as they lacked role models upon which they could rely for guidance and support. Finally, students frequently mentioned that completing admission applications, securing loans, and preparing for post-secondary life all appeared as unreasonable barriers. Unless there were systems in place to address these concerns, these students would remain in the pool of high

school graduates who either could not or believed they could not successfully matriculate into college and then ultimately graduate.

Of noteworthy importance to the notion of rigor as it is determined from the particular study under investigation is the research gathered and analyzed by Leon Botstein, president of Bard College and Simon's Rock College of Bard. In 2001-2002, Bard Early College endured its first year as an early college high school that functioned in collaboration with and on the campus of Simon's Rock College, a school that as of the publication of the article was the only four-year college that provided higher education opportunities to rising junior or senior high school students (2003). The opportunities for the rising high school upperclassmen were not part of an early college program; instead, as Botstein points out, the school, which is located in Great Barrington, Massachusetts, had over twenty-five years of established academic programs and an Institute for Writing and Thinking (2003), both of which contributed to the foundation necessary for an early college program.

New York City Schools Chancellor Harold O. Levy partnered with Bard during the process of devising the early college program, emphasizing throughout the duration of the creation process that the early college would remain a public school, not a private or charter school (Botstein, 2003). With curriculum as the overarching purpose of the early college program, the classes—often small in size—were structured in a seminar-style, and, as with the Cross Creek Early College, "the first two years at BHSEC students undertake an integrated program with a solid grounding in mathematics, science, history, English, and foreign languages" (Botstein, 2003). Virtually all of the classes were taught by faculty members who were deemed subject-matter experts in their fields and who held doctoral degrees.

The results of Bard Early College reveal that from its first founding, early college high school programs have prompted the diverse students to thrive within the early college setting. The school received adequate funding through the Bill and Melinda Gates Foundation, Carnegie Corporation, Open Society Institute, Ball Foundation, and more (Botstein, 2003). Furthering that, Bard Early College High School, an early college program that started a mere year prior to the publication of this article, had already became a leading example for educational leaders and educators interested in developing their own rigorous academic program that seeks to improve minority high school students' advancement from secondary to postsecondary education through a nurturing, yet well-structured, environment.

One major aspect of Botstein's research on Bard Early College High School is that of minority students' matriculation from the secondary education system to the postsecondary education system. This research pointed out that African American and Latino students are less likely to graduate high school and enroll in a two or four year college, and the students who do enroll in college are at a greater risk for dropping out or not returning beyond the freshman year (Botstein, 2003). Though Botstein's research is dated over ten years, Denise McDonald and Tina Farrell (2012) contend in their more recent study of 31 disadvantaged ECHS students that minority students who fall into the aforementioned demographic categories remain at-risk.

In a grounded theory research study, McDonald and Farrell (2012) conducted focus group interviews of 31 early college students because the researchers affirm that students' voices are essential when determining perceptions of a college transition program like that of the early colleges. Unlike this current study, McDonald and Farrell employed focus groups to interview the 31 students. The focus groups were conducted as group interview sessions of the students who were divided into four groups—two groups of freshman students and two groups of sophomore students, and the interviews were conducted by several interviewers who were

responsible for asking questions, observing, and recording responses (McDonald & Farrell, 2012). Audiotaping and videotaping were methods used to record responses and body movements/facial expressions during the interview session. From this study, McDonald and Farrell (2012) determined four major themes: Readiness, Learning Community, Identity, and Productivity. Several of the 31 student participants in McDonald and Farrell's study expressed that a major difficulty of an early college program was not necessarily the rigorous curriculum; instead, the students discussed that having to forego the typical high school functions in lieu of a college degree at an early age was a difficult and frustrating position for a teenager who has limited experience dealing with real-world stressors and pressures.

Similar to the students in McDonald and Farrell's study that concluded teenage students benefit from a rigorous curriculum, yet struggle with social identity and adjusting to a more advanced academic setting, previous research conducted on early college senior students' perceptions of their high school actually reveals that some students found balance with the future-based focus and beneficial academic program. In fact, one student even claimed that the program guided the student toward true self-identity (Kaniuka, 2010). In consideration of the fact that early college students are young, impressionable adults, guiding the students toward self-identity while also engaging the students in an extensive curriculum is a positive attribute of the program.

Considering the previous studies, several limitations persist, specifically that both studies consisted of data gathered from students who were currently attending early college high schools. Research regarding early college graduates' perspectives on the early college experience is not accessible; such research will provide a more reliable analysis of the voices of early college high school students, as students who fall into the early college age group are not as likely as mature and matriculated students to provide a comprehensive assessment of the early college program.

PERSPECTIVES AND THEORETICAL FRAMEWORK

The factors that influence student success in college have been studied in detail and, with that, colleges and universities have implemented programs, courses, and approaches (Boudreau & Kromrey, 1994, Cambiano et al, 2000, Tinto, 1993. These programs attempt to develop support systems, establish relationships, and create environments that students and researchers have found to be significant factors related to improved college success. Research has examined how race, gender, and wealth are factors that influence college success; furthermore, the factors need to be considered when designing specific approaches (Berkner & Chavez, 1997). Related research has examined the link between college success and pre-college preparation, namely at the secondary level (Checkley, 2001). Research found that a more challenging high school curriculum that includes advanced math and college preparatory courses is linked to greater success. The link is even more profound for minority students, as the pre-college experiences are significant predictors of college success; however, these studies usually examine the impact high school experiences have on being accepted to college or the freshman year (see Cabrera & La Nasa, 2000a, 2000b; Horn & Kojaku, 2001).

Little research has been done to examine if high school reforms that are aligned to the above have had an impact beyond high school and if so what aspects of the reform were seen as meaningful to the students. The studies that have been conducted on early college high schools

have examined high school student performance in areas such as attendance, test scores, behavior, and graduation (Edmunds et. al., 2010, Kaniuka, 2011, Kaniuka 2012, SERVE 2010). While critical, these studies fail to evaluate the long-term impact of such reform models on students. Early college high schools are required to adhere to a well-defined list of design principles. These design principles are presented in Table 1.

TABLE 1
North Carolina High School Innovation Design Principles

Concept	Definition
Ready for College	High School Innovation Projects (HSIP) are characterized by the pervasive, transparent, and consistent understanding that the school exists for the purpose of preparing all students for college and work. They maintain a common set of high standards for every student to overcome the harmful consequences of tracking and sorting.
Require Powerful Teaching and Learning	HSIP are characterized by the presence of commonly held standards for high quality instructional practice. Teachers in these schools design rigorous instruction that ensures the development of critical thinking, application, and problem solving skills often neglected in traditional settings.
Personalization	Staffs in High School Innovation Projects understand that knowing students well is an essential condition of helping them achieve academically. These high schools ensure adults leverage knowledge of students in order to improve student learning.
Redefine Professionalism	The responsibility to the shared vision of the HSIP is evident in the collaborative, creative, and leadership roles of all adult staff in the school. The staffs of these schools take responsibility for the success of every student, hold themselves accountable to their colleagues, and are reflective about their roles.
Purposeful Design	High School Innovation Projects are designed to create the conditions that ensure the other four design principles: ready for college, powerful teaching and learning, personalization, and redefined professionalism. The organization of time, space, and the allocation of resources ensures that these best practices become common practice.

Note: Summarized from the North Carolina New Schools Project (2012)

The early college program aligns high school and college classes in a manner that accelerates four years of high school into two years and coordinates the instructional delivery in the high school and college environments (Adelman, 1999). A seamless environment (NCNSP, 2012) is facilitated by the fact that all early colleges are located in college campuses which allows for this continuity of instructional practice (NCNSP, 2012) and these design principles are

consistent with suggestions offered by previous research (Martinez & Klopott, 2005, Phillips, 1997, Shouse, 1996).

METHODS

A mixed methods approach was used to gather the data in an attempt to answer the research questions. Data for research question one was provided by the university's institutional research department covering four academic years. Grounded theory (Strauss & Corbin, 1990) was used to analyze interview data to reveal how students related the early college experience to college success. All interviews were coded and themes were developed to communicate the perspectives early college students had with respect to attending high school, as well as the impact the program had on their current college experience. To model the longitudinal academic performance trends of early college students once they matriculated into college, the latent growth curve model was used.

Participants

Two groups of students were used to serve as research participants. Although not identified in the quantitative data analysis, the interview participants' academic data was included in the SEM analysis.

Quantitative. The data for the quantitative analysis covered four academic years from the fall of 2010 to the spring of 2014. The data were provided to the researchers from the university's institutional research department. The participants were all early college students who attended the early college, which was located on the university's campus. As stated previously, 87 students were contacted for interviews however; only 81 were included in this aspect of the study as data for six students were not available to the researchers. The analysis included a second model, and the participants for this analysis included the original 81 early college students plus a group of matched non-early college students. The comparison group was developed using propensity score matching (see Rosenbaum & Rubin, 1983) under one to one matching with no replacement (Leuven & Sianesi, 2014). The samples were matched on the pre-treatment covariates of SAT score, high school GPA, race, and ethnicity. The demographic data for these students are presented in Table 3, and the results of this matching, including the reduction of bias in the samples, is reported in Table 4 below.

Qualitative. Eighty-seven students who previously graduated the early college and attended the subject university covering the periods investigated in the quantitative analysis were contacted via email and mass mailings. Of the eighty-seven students, 14 students responded with interest to participate in interviews. The students responded through email with their preferred date and time for the telephone interviews. The students were interviewed by telephone, and the interviews were audiotaped. The interviews were conducted individually, between one researcher and one former early college student. After the interviews were conducted, the researchers employed the grounded theory technique to extract common themes from the interviews (Bernard & Ryan, 2010).

Participant Identity. In terms of participant identity, the races and genders of the students who participated in the study comprise of the following: five Black males, eight Black females, and a White male. Table 2 also indicates the ethnicities by gender of the interviewees. As the table indicates, the only two ethnicities included in the interviews were White and Black. While the researchers attempted to reach students of various ethnicities, only Black and White students agreed to participation in this study. At the time of the interviews, of the 14 students, six were seniors, four were juniors, three were freshman, and one was at the graduate level. One student was taking a semester break due to maternity needs; this student did not disclose her level in college upon taking the leave of absence from academia. One student—one of the six seniors—transferred from the subject university, an HBCU, to another university within the same public state university system when she was a junior. Familial reasons and a desire for location change were her reasons for transfer. All of the students are either attending or have attended the HBCU in which the ECHS was located. Specifically for the interviews, all of the interviewees were former early college students who graduated the program in good standing. All of the former students interviewed for this study maintained between a 3.0 and a 4.0 high school GPA while at the ECHS.

TABLE 2
Ethnicity and Gender of Interviewed Early College Graduates

Gender	Ethnicity						
	Asian	Black	Hispanic	Native American	Other/Unknown	Two or more	White
Female	0	8	0	0	0	0	0
Male	0	5	0	0	0	0	1

Setting. Founded in 2002, the Early College High School is located in an urban area in southeastern, North Carolina, and it functions as a component of the university campus. The host university is an HBCU, thus the majority population of students is African American. The university is a mid-sized institution that offers baccalaureate, masters and doctoral degrees. The university has approximately 5,600 undergraduate and 1,200 graduate students. The early college is located in a building, which is also shared with the School of Education; therefore, the high school students are interacting with college students on a daily basis. Additionally, there are approximately 240 students enrolled at the ECHS, and the ECHS faculty members are high school faculty who are highly qualified teachers in the state of North Carolina. As the school is small in comparison to traditional high schools in the surrounding county, most high schools are in the 1,000-plus student population range, the faculty to student ratio is much smaller. Finally, as one important point about setting, the ECHS has a larger proportion of female students, as females make up about 67% of the population and males make up the additional 33%, respectively, which mirrors the host university's gender composition.

Data Analysis

Quantitative. To address research question two, the data were analyzed using a latent growth curve design with five repeated measures (GPA) (see Acock, 2013). The continuous indicator variables were the students' semester-by-semester grade point average (GPA) covering five consecutive fall and spring semesters that could have possible value ranging from zero to four. The first GPA measure is each participant's final GPA for the post-secondary courses that were offered as part of the ECHS curriculum taken before matriculation into the university. Five semesters were chosen 1) to provide the models with sufficient degrees of freedom, and 2) many of the early college students stay for approximately four semesters once they enter the university.

The baseline model was developed by first running an unconditional model to determine the intraclass correlation coefficient to assess the degree of dependency across measures. Model development preceded with first a linear model, then a model that included a quadratic term. The results for the quadratic indicated a non-significant quadratic slope term, and it was decided to use the linear model as the results for model fit were acceptable. Once the linear model was selected, the first analysis produced the intercepts for each of the five GPA predictor variables. The second analysis constrained these intercepts to be zero and called for estimates of the model intercept and slope. In both cases, standardized and unstandardized solutions were developed and overall model fit. Furthermore, equation goodness of fit statistics was produced. The resulting model is depicted in Figure 1. A more advanced model using a time invariant covariate was developed to extend the original analysis to include the effect of high school preparation had on both early college students and traditionally prepared students. The time invariant covariate was coded non-early college (0) and early college (1). To achieve model convergence the error term for the latent variable slope was constrained as was indicated through model diagnostics. Model two is depicted in figure 2. All analyses were conducted with STATA Data Analysis and Statistical Software, version 13.1, using maximum likelihood with missing values.

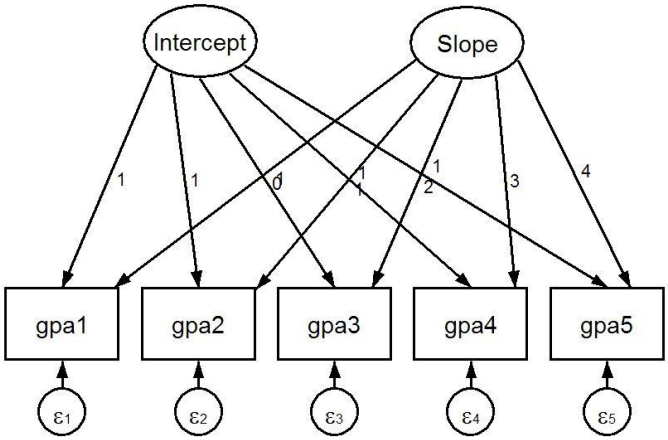

Figure 1. Linear Growth Curve Model 1

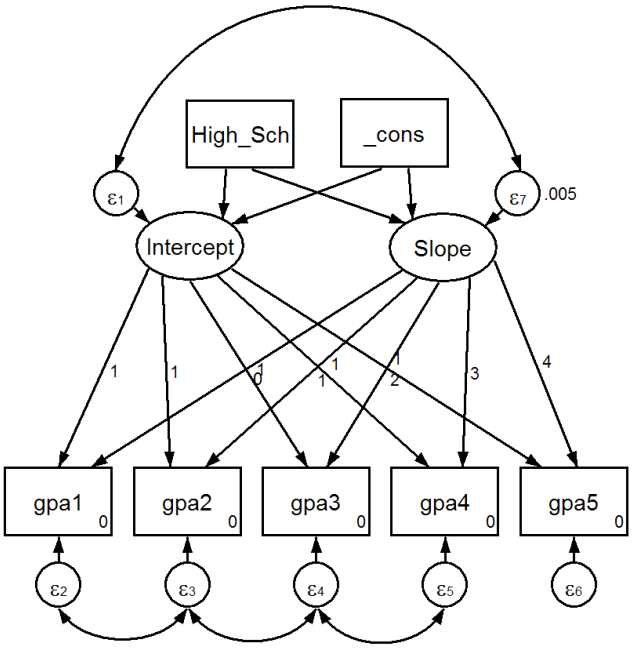

Figure 2. Linear Growth Curve with Time Invariant Covariate

Qualitative. To address research question one, the interviews were analyzed using five complex tasks, the first of which included "discovering themes and subthemes" (Bernard & Ryan, 2010, p. 54). The major themes included the following: support, rigor, time management, and immersion. The subthemes were identified but only to place the ambiguous or embedded responses in the appropriate themes. The second task involved "describing the core and peripheral elements of themes" (Bernard & Ryan, 2010, p. 54), as at this point in the data analysis, the researchers determined why these four themes were common in the responses and how the four themes were interrelated. The researchers also considered how the variety of each theme's expression was controlled by specific contexts. The third complex task in which the researchers engaged was "building hierarchies of themes or codebooks" (Bernard & Ryan, 2010, p. 54), which involved ranking the themes in order of what seemed to be most emphasized among the respondents' responses. The themes are discussed in order of rank; however, of importance to note is that even though the themes were ranked during the data analysis process, all four themes are essential to consider in responding to the students' attributes of the ECHS experiences that were perceived by graduates as supportive of success in college. Finally, the fourth and fifth complex steps involved applying and linking the themes, which consisted of attaching each of the four themes to the "chunks of actual text" and "linking themes to theoretical models" (Bernard & Ryan, 2010, p. 54-55).

RESULTS

Quantitative

Demographic Data for Participants. The descriptive statistics for the participants are presented in Table 3. The frequencies of the race and gender distributions show that there are 51 females, or 62.9% of the sample, which is slightly below the institution's average of 64.2%. Blacks make up 69.1% of the sample, which equals the institution's percent of black students with white students in this sample well below the overall average of 17.4%. Therefore, the early college students who decide to continue their higher education experiences at the university where the early college is located tend to be fairly representative of the university as a whole with regards to sex; however, when considering race, the early college students that chose to attend tend to be of a minority more often than the general university population.

TABLE 3.
Frequency Distribution of Participants' Race and Gender for Latent Growth Curve Model

Gender	Ethnicity Asian	Black	Hispanic	Native American	Other/Unknown	Two or more	White
Early College							
Female	0	40	1	1	7	0	2
Male	1	16	4	1	1	1	6
Non- Early College*							
Female	1	33	4	3	0	3	2
Male	0	26	4	1	1	2	1

Note * Propensity score matched group for model 2

The matching although not perfect was on overall improvement between the two groups. The matching process was used to more closely align the two groups as the early college students in general showed higher scores on SAT and high school GPA as shown in table 3 at it was felt that balancing the samples was needed to create somewhat comparable groups. Due to the overall design of this study, no attempt is made to generalize the results with matching, but rather to reflect that early college students do perform better on select high school related measures than the non-early college students attending this university.

Table 4.
Propensity Score Matching Improvement in Bias Across Pretreatment Covariates

Variable	Unmatched Matched	Percent Reduction Percent Bias	Bias	*t*	*p*
SAT	U	65.8		7.53	0.00
	M	-2.3	96.5	-0.13	0.89
HS GPA	U	77.9		7.3	0.00
	M	0.4	99.5	0.02	0.98
Gender	U	8.3		0.72	0.47
	M	-12.9	-55.3	-0.8	0.43
Ethncity	U	5.8		0.48	0.63
	M	-11.7	-101.5	-0.69	0.49

Linear Growth Curve. The results for both analyses are reported in Table 5. Early college student semester by semester GPA remains remarkably stable across the five time periods as the scores ranged from a high of 2.83 (first semester fully as a college student) to a low of 2.72, the fourth semester after high school graduation. The range of 0.11 GPA points is small, representing approximately a 3.8% decline over the four measurement periods. The GPA range for the entire student population over this same time period was much narrower, only ranging 0.05 points from a high of 2.78 to 2.73. Regardless, the differences by semester were 0.03, 0.1, 0.2, 0.0, and 0.06 with the early college students having the higher scores, except for the last measure. When tested, not one of the differences was found to be statistically significant.

The unconditional model was run to develop the intraclass correlation coefficient, which was 0.81, indicating a high degree of dependence in GPA scores across the five semesters. In fact the variability between people was 0.41 units and variance within people was 0.05 units. Thus, the variance in GPA for all students across the semesters was much greater than the variance found within each person. The second model run estimated the constant terms or mean GPA scores for the group for each of the measures. As seen in Table 3, and discussed somewhat above, the GPA scores are stable exhibiting a slight decline from the time the student's last college course GPA while a high school student to the fifth and final score. In all cases, the indicator variable's constant, intercept, and slope estimates were highly significant as would be expected given the design of the model. Of central interest to this study are the estimated latent variable intercept and slope means. The equation used to interpret the results is depicted in Equation 1:

$$GPA_{est} = intercept_{est} + slope_{est}(semester) \qquad EQ\ 1$$

Substituting the results in Equation 1 we have:

$$GPA_{est} = 2.82 - 0.03(semester)$$

Therefore, as predicted by the equation, the further each semester GPA is measured from the last GPA in high school, we predict that the GPA for that time period will decline and the decline will be statistically significant given the results reported in Table 5. The estimated values differ

from the predicted means as error is not accounted for in equation 1; however, the pattern of results is consistent with what was estimated. That is, the fifth GPA measure is estimated to be GPA5 =
2.82 – 0.12 or 2.7, which is very close to the estimated 2.72.

TABLE 5.
Results for Latent Growth Curve- Analysis 1 and Analysis 2**, (Standardized) (N=81)

Measurement	Estimate*	S.E.	*z*	*p*	95% Confidence Interval	
					Lower	Upper
GPA_1						
Intercept	(0.87)	(0.03)	(32.46)	(<0.00)	(0.82)	(0.92)
Constant	2.79 (3.85)	0.08 (0.28)	34.98(13.69)	<0.00	2.64 (3.3)	2.95 (4.4)
GPA_2						
Intercept	(0.97)	(0.01)	(112.98)	(<0.00)	(0.95)	(0.98)
Slope	(0.08)	(0.02)	(5.04)	(<0.00)	(0.05)	(0.12)
Constant	2.83 (4.33)	0.07 (0.36)	38.08 (11.92)	<0.00	2.68 (3.62)	2.97 (5.05)
GPA_3						
Intercept	(0.98)	(0.01)	(140.3)	(<0.00)	(0.96)	(0.99)
Slope	(0.17)	(0.03)	(5.15)	(<0.00)	(0.11)	(0.23)
Constant	2.76 (4.28)	0.07 (0.37)	37.52 (11.71)	<0.00	2.62 (3.57)	2.91 (5)
GPA_4						
Intercept	(0.96)	(0.01)	(70.63)	(<0.00)	(0.93)	(0.98)
Slope	(0.25)	(0.05)	(5.34)	(<0.00)	(0.16)	(0.34)
Constant	2.74 (4.15)	0.08 (0.34)	36.23 (12.08)	<0.00	2.59 (3.48)	2.89 (4.83)
GPA_5						
Intercept	(0.93)	(0.02)	(46.07)	(<0.00)	(0.89)	(0.97)
Slope	(0.33)	(0.06)	(5.56)	(<0.00)	(0.21)	(0.44)
Constant	2.72 (4)	0.08 (0.34)	34.7 (12.44)	<0.00	2.56 (3.37)	2.87 (4.83)
Variance						
GPA_1	0.13 (0.24)	0.02 (0.05)			0.09 (0.17)	0.19 (0.36)
GPA_2	0.02 (0.06)	0.01 (0.02)			0.01 (0.03)	0.04 (0.09)
GPA_3	0.01 (0.01)	0.01 (0.01)			0.01 (0.01)	0.01 (0.03)
GPA_4	0.01 (0.02)	0.01 (0.01)			0.01 (0.02)	0.02 (0.04)
GPA_5	0.01 (0.03)	0.01 (0.01)			0.01 (0.01)	.013 (0.06)
Intercept	0.39	0.07			0.27	0.55
Slope	0.01	0.01			0.01	0.01
Model 2**						
Latent						
Intercept	2.82 (4.46)	0.07 (0.39)	38.52	<0.00	2.68 (3.69)	2.97 (5.24)
Slope	-0.03 (-0.51)	0.01(0.19)	-2.82	0.005	-0.05 (-0.89)	-0.01 (-0.12)

Note: Analysis 1: χ^2 (8) =5.85, p=0.664, R^2 = 0.99, RMSEA = 0.000, 90% CI 0.000 – 0.11, CFI = 1.00
* Since the Intercept and Slope were constrained in model 1 as indicated in figure 1, only the standardized estimates for these two variables are reported
Analysis 2: χ^2 (11) =9.12, p=0.611, R^2 = 0.99, RMSEA = 0.000, 90% CI 0.000 – 0.1, CFI = 1.00

TABLE 6.
The results for the time invariant model are shown for both (standardized) and unstandarized results.(N=162)

	Estimate*	S.E.	*z*	*p*	95% Confidence Interval	
					Lower	Upper
Structural						
Intercept						
High School	-0.304 (-0.236)	0.124 (0.088)	-2.45	0.014	-0.547 (-0.408)	-0.061 (-0.063)
Constant	3.11 (4.831)	0.093 (0.287)	33.33	<0.00	2.923 (4.268)	3.293 (5.392)
Slope						
High School	0.043 (0.29)	0.02 (0.126)	2.11	0.035	0.002 (0.043)	0.083 (0.537)
Constant	-0.062 (-0.835)	0.013 (0.169)	-4.66	<0.00	-0.088 (-1.153)	-0.036 (-0.514)
Measurement						
GPA_1						
Intercept	(0.881)	(0.019)			(0.885)	(0.917)
GPA_2						
Intercept	(0.872)	(0.027)			(0.819)	(0.926)
Slope	(0.1)	(0.006)			(0.008)	(0.112)
GPA_3						
Intercept	(0.947)	(0.037)			(0.873)	(1.02)
Slope	(0.217)	(0.014)			(0.188)	(0.246)
GPA_4						
Intercept	(0.846)	(0.053)			(0.765)	(0.971)
Slope	(0.298)	(0.019)			(0.261)	(0.337)
GPA_5						
Intercept	(0.961)	(0.071)			(0.812)	(1.111)
Slope	(0.441)	(0.036)			(0.371)	(0.511)
Variance						
GPA_1	0.119 (0.223)	0.013 (0.033)			0.096 (0.167)	0.147 (0.298)
GPA_2	0.139 (0.255)	0.016 (0.031)			0.111 (0.2)	0.174 (0.325)
GPA_3	0.055 (0.119)	0.008 (0.019)			0.1 (0.087)	0.169 (0.164)
GPA_4	0.131 (0.237)	0.017 (0.033)			0.001 (0.179)	0.163 (0.313)
GPA_5	0.005 (0.011)	0.008 (0.019)			0.001 (0.001)	.0163 (0.323)
Intercept	0.391 (0.994)	0.053 (0.041)			0.299 (0.866)	0.511 (1.029)
Slope	0.005(0.916)	(0.073)			(0.782)	(1.071)
Covaraince						
GPA1*GPA2	0.008 (0.064)	0.011 (0.086)	0.71	0.475	-0.014 (-0.104)	0.031 (0.232)
GPA2*GPA3	0.049 (0.562)	0.007 (0.051)	6.35	<0.00	0.033 (0.461)	0.064 (0.656)
GPA3*GPA4	-0.001(-0.021)	0.018 (0.22)	-.009	0.925	-038(-0.452)	0.035 (0.41)
Intercept*Slope	-0.004(-0.09)	0.007 (0.017)	-0.52	0.606	-0.019 (-0.441)	0.011 (0.253)

Note: χ^2 (11) =12.27, p=0.344, R^2 = 0.122, RMSEA = 0.027, 90% CI 0.000 – 0.089, CFI = 0.998

The results in table 6 support the first analysis that showed that the college GPA performance declined over time and further extended that analysis to illustrate the nature of the negative growth. The results for the structural portion of the analysis are translated into equation form below.

GPA = 3.11 - 0.304(High School) -0.062(Semester) + 0.043(High School) EQ2

Applying the values for the time invariant covariate we see that for non-early college students the estimated GPA = 3.048, in contrast to the estimated GPA for early college students to be 2.787. This estimated GPA is slightly different than the one estimated in the first model, as the second model controls for the difference of high school preparation. Given that, the five-semester mean estimated in the first model was 2.768, very close to the estimated GPA for the second model. Although the college GPA for early college students is substantially lower, the estimated rate of change is moderated to -0.019 compared to estimated rate of change for non-early college students of 0.062.

Qualitative

Upon interviewing the former early college students, the researchers concluded that the students perceived that the early college experience influenced their college experience across four major themes: support, rigor, time management, and immersion. During the interview transcription process, each of the four major themes was the focus of discussion throughout the interview; the themes were derived empirically through the recognition of repetitiveness within the interviewees' responses. That is to say, when students were asked to elaborate on their responses for some of the interview questions, the themes were continuously embedded in the students' responses. Even though some of the themes were obvious, some expressions of the themes were more subtle and symbolic, thus requiring the researchers to closely examine the respondents' interview tapes for connotations to the themes.

Support. The theme of support focused on the guidance and resources that students received from their high school early college teachers, as the early college program provides students with adult mentors who guide the students through the two-year early college journey. After all, the early college program is often a major change for the young learners who come from varying backgrounds (e.g. public schools, private schools, homeschooling). Of the 14 respondents, one student spent time in the home school setting prior to entering the ECHS and one student attended a private school for a portion of her educational career before attending the ECHS. The remaining 12 students came from various schools throughout the Cumberland County, North Carolina area. Despite the previous backgrounds of the students, all of the 14 students explained that the mentor/mentee relationship commonly found in the early college high school transcended the traditional student/teacher roles that are typical of a regular high school setting and of a traditional university atmosphere. One African American female student stated that one of the aspects of the early college experience that was most effective was homeroom in which she received training on being an effective students through discussions and lessons on Steven Covey's *The Seven Habits of Highly Effective People*. Another student, an African American male, discussed that his early college experience made him college ready because at Cross Creek Early College, as opposed to elementary and middle school, he was challenged and motivated to reach a level that he did not even know he could reach. He explained: "Each and every single class that I took in that school each gave me something that helped me in school…My teachers motivated me each and every day." Henceforth, as both of these students depict, the students viewed the teachers as adults who cared about their success and motivated the students to become well-rounded student-citizens.

Another major facet of support was that all effort was made to ensure student success. In contrast to the first facet, this one was not always seen as positive. Several students felt that failure should be allowed, whereby reflecting college life in particular and adult life in general. In fact, one student, when asked to comment on the support she received at the early college high school as compared to the support she receives as a college student, she remarked, "Once you leave early college, you lose that additional support that you were used to…when you're in high school, you always have notes to help you understand and study." In other words, this particular student explains that the early college offers a sense of support that is unique as compared to the traditional high school experience, as well as the college/university experience. To further that, the particular student who discussed this element of support that the early college offers is also the student who has since transferred to a university outside of the Fayetteville, North Carolina region; she now attends the University of North Carolina at Charlotte (UNC-C). Given that her GPA actually declined once she transferred to UNC-C after attending Fayetteville State University for a semester as a junior, one might determine that even though the support at the early college was a daily aspect of the early college experience, the support is not a guaranteed aspect of college for the remaining years at the undergraduate level. Another factor to consider in terms of the student's declining GPA and transferred status is that students at the Cross Creek Early College are provided support relevant to the support necessary for furthering one's education at Fayetteville State University, the site of the Cross Creek Early College. One female African American student expressed dissent toward the fact that the early college is not necessarily positive for students who wish to study beyond the undergraduate level. At the time of the interview, this student was trying to get accepted into graduate school but found that her lack of research during her accelerated undergraduate years made her less competitive as compared to students who attended a four-year university and engaged in more varied research opportunities.

Nevertheless, in an effort to determine the level of support—often an abstract concept that varies based on the individual student, the students were asked to comment on their total accumulated college credits upon graduation from the ECHS. All 14 interviewed students had at least 40 credits and felt that not failing placed them ahead of their peers. The amount of credits the students earned leads one to conclude that the support at the early college level was, at the minimum, sufficient enough to guide the students through the earning of over one complete year of college credits, a feat that clearly set the students apart from their peers.

Rigor. As one of the major themes that was entrenched in the early college program, rigor was among the most common themes discussed among the interviewees. Of the 14 students interviewed in this study, all 14 commented that rigor was embodied in the course work the students were asked to do. Rigor was seen in the amount of work given to students. The students commented that they were asked to do much more as compared to their traditional high school peers. Examples of the work included extensive note taking, presentations, and collaborative multi-step projects. In terms of extensive note taking, students elaborated that in the traditional high school setting, note taking was not emphasized. Rather, the students remarked that the high school teachers often provided classwork that was tailored to the inclusive high school curriculum to the multiple learning levels. One student, an African American female, remarked that she felt the curriculum was "boring" and lacked "challenge." The note taking, though, was a daily aspect of the early college experience; after all, the early college students are taking college

courses on a college campus, and most of the participants acknowledged that early college and college work both involve an extensive amount of note taking.

Another organization skill that pertained to rigor was called Advancement Via Individual Determination (AVID). When asked if any specific aspect of the programs guided the students toward being college ready, one African American female student remarked that AVID was the program that particularly helped her to be college ready. She further noted that organization was a significant issue that many college students face because the curriculum is quite rigorous in comparison to a traditional high school curriculum. She said that time management was a major issue and that it often prevented students from adapting to the rigorous curriculum if the students lacked the time management skills; however, at the early college, the faculty teach the students to utilize time management in conjunction with the rigorous curriculum.

Time Management. From the perspectives of former early college students, time management was depicted as a highly valuable skill that the students were taught during the duration of being early college students. In consideration of the fact that the interviews were conducted after the students had already graduated from the early college high school, the interviewees were able to reflect upon their early college year(s) in comparison to their current position as college students. All of the 14 interviewed students, including the individual who has taken a semester leave from college (see Support), contended that time management was one highly valuable skill that was emphasized and reinforced at the early college level.

Though the students collectively discussed how time management impacted their overall effectiveness at the early college and college levels, each student conveyed his or her own personal experience with time management as a component of the early college high school. For example, one student stated that "Prior to entrance into the early college, the traditional high school curriculum was not challenging, and he was not made to have extensive time management skills." However, upon entrance into the early college, he was not only provided with "faculty who effectively scheduled each class period," but also "faculty who encouraged the students to utilize day planners, outlines of deliverables with due dates, and pre-planning for the duration of the semester." Another student depicted that as an upper classman at the university level, she is now aware of the value of learning time management skills at the early college level. Had she not been in an environment that stressed time management in order to complete all of the extensive coursework, she felt that she would have been ill-prepared for the subsequent years beyond the early college level. Finally, as evidence to support the fact that the early college high schools guide students toward better time management skills, when asked if the early college high school guided the student toward being college ready, one student, a graduate student, explained that "one aspect of the early college experience that was most effective was that the faculty guided the students toward a strong academic-family-social balance." Often, students may find difficulty in managing the various aspects of life, not simply the aspects of academic life; henceforth, having a faculty that promotes the balance of such life elements provides the young adult learners with essential skills that will follow the students through their process of matriculation into the upper division courses and even graduate school.

Immersion. Immersion was depicted as an influential and powerful aspect of the early college experience. Immersion is the act of being a high school student on a college campus who had the opportunity to take college classes. When asked about being ready for college the students, all 14 respondents stated emphatically that attending college classes allowed them the

opportunity to know about the demands of college work, develop a sense of freedom and responsibility that many high school student do not experience, and gain exposure to college faculty. One African American female student who earned 49 credits and even increased her GPA from early college to college, going from a 3.5 to a 3.86, even claimed that because she had been in the college environment from the age of 16 and already began working toward her degree in Criminal Justice at the ECHS level, she was more comfortable with the college instructors, workload, and demands of college as an undergraduate student. Quite apparently, the most powerful aspects of the early college experience for these students was manifested in the experiences of attending college classes on a college campus and having substantive high school faculty support when difficulties of the rigorous curriculum were encountered.

DISCUSSION

The early college initiative has been shown to provide measureable benefits to students, especially traditionally underrepresented populations however there is a limited understanding of the degree of success these students experience in post-secondary environments (Garet, Knudson, & Hoshen, 2014). This study used the case study approach looking at the students of one early college as they matriculated into college at the institution that hosted their high school and is supportive of previous research (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Students tend to discount high school experiences as a major contributing factor for their continued success in college and quantitatively, whatever effects there were, these tended to diminish in impact. What this study also revealed was the degree of consistency the individual students demonstrated in maintaining previous levels of academic success.

High School Experience

Even though the students felt that they would have been successful regardless if they attended an early college program or not, these students did attribute beneficial outcomes as a result of attending the ECHS. Traditional high schools can offer students the same curricula, mentoring and support, and college level instruction as provided by an early college. The missing component is the immersive environment where high school students can safely experience college on a college campus, understand and develop relationships with college faculty, and develop an understanding and familiarity of the college environment (Fries-Britt & Turner, 2002, Gerdes & Mallinckrodt, 1994, Strage, 2000). The concept of becoming familiar with the college environment in the relative safety of high school may explain the strong indications of high degrees of confidence and self-efficacy communicated by these students. The idea of developing a strong concept of self-efficacy has been linked to what students experience in school and it has been argued that it may develop into a supportive factor for future academic success (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011). These authors have argued that because efficacy is responsive to successful experiences, teachers that nurture this can shape efficacy development. Clearly, these early college students while in college did no worse than the traditional college students, and by design being much younger, these positive experiences surely could be argued as supportive of positive efficacy development.

Goal setting and motivation has been studied as contributing factors to student's success in college (Harackiewicz, Barron, Tauer & Elliot, 2002). Although students did not attribute the curriculum and instruction provided at the early college in any substantial frequency as supportive of success at the university, one course was mentioned by several students, Advancement Via Individual Determination ([AVID], AVID, n.d.), that had provided them with a comparative advantage to their peers. One central aspect to the course is the task of goal setting and motivation to succeed. As argued by Harackiewicz, et. al., "mastery and performance approach goals have positive and complementary consequences for motivation and performance in college courses over the course of students' academic careers. (p 574)"

In addition to goal setting several researchers have found that students who possess more refined study skills and time management tend to perform at higher levels that their peers who did not demonstrate these skills (Brint & Cantwell, 2010; Crede & Kuncel, 2008; Hassanbeigi et al., 2011 & Mendezabal, 2013) suggests that to improve the quality of learning among students, we have to start by improving their study habits and attitudes. Therefore, the association that some of the early college students attributed to this high school course and their subsequent success is college noteworthy.

In related research, Marteniz and Klopott (2003) offer that nurturing environments are critical for student success and that early colleges with small class sizes and extraordinarily close relations with university faculty can foster such relationships that students value (Kaniuka & Vickers, 2010). Johnston (2006), presented that there are significant relationships between achievement motivation and rapport with faculty and achievement—two characteristics that were mentioned by the interview participants and in previous research. Therefore having experienced faculty mentoring while in high school may have developed in the early college students a sense of security and support and degree of confidence to contact faculty when in need of assistance. In the interviews, students frequently discussed the supportive environments in high school and given that these supportive environments may yield improved efficacy outcomes, students can enjoy greater degrees of success. These efficacy constructs were evident in several of the interviews as students felt strongly about their ability to succeed and control over academic outcomes. In addition to the relationships that developed between students and faculty, housing the early college on a university campus provided students a critical success factor that they believed allowed them the opportunity to seamlessly transition into college, the idea of immersion (see DiMaria, 2013).

Post Secondary Performance

The idea that high schools should impact college success is not new nor is the idea that the purpose of high school is to prepare students for post-secondary educational experiences (Mackenzie, 1984; Spellings, 2006). Assessing the impact of high school on college performance has mainly focused on what measures associated with high school (SAT/ACT), high school GPA, or courses taken have on college entrance and predicting freshman achievement (Noble, 1991; Nobel & Sawyer, 2002). Few studies exist that attempt to determine the longitudinal effects of high school on college achievement. Even the above cited reform efforts and policy recommendations focus on access to postsecondary opportunities and not long-term success students experience or even graduation. First and foremost the early college model studied herein, does provide access to traditionally underrepresented populations and that their success

while high school students is highly desirable. *Do these desirable outcomes persist after high school?* and *To what degree?* are questions some answers are provided for in this research paper.

The results presented herein show that the early college students experienced a remarkably stable transition from the combined high school/university environment to the university environment. In a review of research study conducted by Hills (1965) he described a term called "transfer shock". This shock occurred when junior college students transferred to senior colleges during their first semester after the transfer, such that the transfer students experienced lower GPAs as compared to their previous experiences and in the majority of cases this decline did not ameliorate and non-transfer students continued to perform at higher levels. The EC students could be considered transfer students however, since they did earn all their credits at the same university, it may be unwarranted to consider these students as pure transfers. The EC students did experience a decline in GPA and did over time experience slower rate of decline as compared to non-transfer students, so from this perspective the EC students' GPA did behave in a similar manner as to what Hills described. We argue that this case is different for as follows. First, EC students are not the pure transfers as described in Hills and as such, the issues Hills argued, as possible contributing factors are not at play. Second, and most critical is that both groups of students experienced this decline in GPA, with EC students experiencing a less severe decline, albeit that the traditional students had higher initial GPAs so their decline may be more of a regression to the mean or a more drastic manifestation of the influence of the culture of the campus than being attributable to other causes.

As argued previously, there may be many factors at work to explain why this occurs, and unfortunately little research is available to explain the retreating effects of high school on post-secondary performance (see Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). This study provides limited evidence that there may be a more durable long-term effect of the early college high school on college performance. Kuh, et. al., found that the concurrent events that exert more influence on student performance over time is no surprise. The results for these early college students seem to suggest that there are possible mediating factors at work in the early college model, which actually may attenuate the losses time and current events exert on the long-term influence that high school education has on college achievement. This may be a strong supposition, as the early college students' GPAs were not higher than the traditionally prepared students, nor did they resist a slight decline; and even though the traditionally prepared students exhibited a modestly more stable GPA, the rate of decline was significantly less for early college high school students.

The early college students included in this study did not attend the freshman orientation programs the traditionally prepared freshman are required to be part of for logical reasons. The early college students had a much different orientation to the university that occurred for two years, not the one year, freshman level that other students experience. One perplexing outcome illustrated in this study is that the early college students did not have appreciably higher GPAs than the other students, despite several of the students' interview responses that seem to illustrate the select group of students' success as graduates from the early college high school. Quite the contrary is true, as illustrated in the second analysis; when matched to students with similar high school academic performance, the early college-prepared students had significantly lower college GPAs across all time periods. This outcome may be attributable to factors not controlled for in this study such as the students' majors. One factor that was not reported above and which could be considered a mediating factor is that of academic load, was examined and found that there was no significant difference between the credit hours attempted by either group.

Limitations and Suggestions for Future Research

The most serious limitation facing this analysis is that the model used was limited by the sample size available to the researchers. The early college model is new in North Carolina being first implemented in 2003 with funds from the Bill and Melinda Gates foundation. Currently there are over 75 ECHS in North Carolina and not many students have matriculated through college in sufficient numbers to support a larger project. The SEM model used to study the long-term performance of students is basic and limited in ability to discern much other than that there is some pattern of achievement that remains well after high school graduation. To make this idea of long-term effects of high school experience, additional data are needed to provide the power necessary for more reliable and generalizable results. To that end, the researchers suggest that this type of study be expanded to include a state-wide sample of college students and look back to their high school preparation and work to establish casual links between the two.

Second, it would be beneficial to interview traditionally prepared students in a similar manner as the early college students to discover what attributions these students make reflecting back on their high school preparation. This type of data would provide researchers with the ability to compare and contrast these results with a deeper understanding of how high school academics influence post-secondary achievement. It is important to study this idea more fully, as policy makers continue to laud the importance of high school reform and the idea that college success is dependent to some degree to how and where students are prepared.

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