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A Meta-analysis on Non-Cognitive Predictors of College Student Academic Performance

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A Meta-analysis on Non-Cognitive Predictors of Academic Performance

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Honor's Thesis Project

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Abstract

There are many factors that affect student success, often measured with academic performance. Research has shown that students attribute stress as a major factor that affects their academic performance (Frazier et al., 2018). This suggests that the ability to cope with stress can improve academic performance. Studies have shown that higher emotional intelligence is linked to higher ability to cope with stress (Wang, Xie, and Cui, 2016). In this meta-analysis, I looked into the relationship across multiple studies between emotional intelligence, grade point average, and other non-cognitive predictors. For the first meta-analysis, seven records relating emotional intelligence to academic performance were included and analyzed using the random effects model. Overall, a small positive relationship was found across these studies ($r = .16$), suggesting that students with higher emotional intelligence were higher on academic performance. In the second meta-analysis, six records relating personality to GPA were analyzed using the random effects model. Overall, the trait showing the greatest relationship with GPA was conscientiousness, with a small positive overall effect, $r = .19$. Ultimately, by analyzing the existing literature on these two relationships, I discovered several small positive relationships between grade point average and non-cognitive factors. Further studies should look into the interaction effects of non-cognitive predictors on academic performance.

Introduction

Rationale

Student success is often defined by a few factors including: graduation rates, retention rates, and academic performance. There are many factors that could be influencing student success. One of those factors could be finances. Universities have shown a one-hundred and six percent increase in net tuition since 1987, which could affect students' ability to stay enrolled in classes (Gordon & Hedlund, 2016). Another factor could be mental health struggles. Mental health has become a crisis across college campuses with one in five college students reporting anxiety or depression (Mackay-Neorr, 2019). Mackay-Neorr found that twenty-two percent of college students experienced three or more adverse childhood experiences, which are linked to long-term negative health outcomes (2019).

Similar to mental health struggles, stress is another factor that can affect student success. Frazier and colleagues found that students most frequently reported stress as the factor that negatively affects their academic performance (2018). However, they found that students who cope due to higher self-efficacy, resilience, and social support had higher GPAs (Frazier et al., 2018). These higher GPAs could mean that college students are staying enrolled to graduation. Kern and colleagues found that GPA had a significant, negative relationship to attrition in college students (1998). To improve retention in college students, I believe two of the main factors we should focus on are emotional intelligence and academic performance. What I want to find out through this meta-analysis is if emotional intelligence or other non-cognitive factors are linked to a higher grade point average in college students.

For the first meta-analysis I focused on two main variables: emotional intelligence and academic achievement. I operationalized these variables by using emotional intelligence

inventories and grade point average (GPA) respectively. These inventories included the Bar-On Emotional Quotient Inventory (EQ-i), which was most frequent, Schutte Emotional Intelligence Scale, and the Trait Emotional Intelligence Questionnaire. The Bar-On EQ-i because is the most widely used emotional intelligence inventory and has been thoroughly validated. The inventory has fifteen factors including: self-regard, emotional self-awareness, assertiveness, independence, empathy, social responsibility, interpersonal relationship, stress tolerance, impulse control, reality-testing, flexibility, problem-solving, self-actualization, optimism, and well-being (The 15 Factors). Bar-On and Handley that internal consistency of all scales were rated from good to excellent (Development, 2003). Bar-On and Handley also found construct validity by comparing different versions of EQ-i to other measures of emotional intelligence (2003).

The Schutte Emotional Intelligence Scale consists of 33 items that the participant rates from strongly disagree to strongly agree (Schutte et al., 1998). Schutte and colleagues focused on three aspects of emotional intelligence to study in their scale which are: appraisal and expression of emotion, regulation of emotion, and utilization of emotion (1998). After a validation study, Schutte and colleagues found that the scale showed discriminant validity, internal reliability, and test-retest reliability (1998).

The Trait Emotional Intelligence Questionnaire consists of 30 items that the participant rates from strongly disagree to strongly agree (Petrides, 2009). Petrides studied emotional intelligence for this questionnaire by using four main factors, which are emotionality, self-control, sociability, and well-being. O'Connor, Nguyen, and Anglim found that the Trait Emotional Intelligence Questionnaire had high construct validity (2017).

I chose to use GPA to represent academic achievement because this is most often used to assess college students and is a commonly understood scale. GPA is also important when

looking at graduation rates; generally a 2.0 GPA is needed to graduate from college. Gershenfeld and colleagues (2015) found that first-year students who eventually graduated had a significantly greater GPA than those who did not graduate.

Objectives

For this meta-analysis, I wanted to take a look across all studies on academic achievement and emotional intelligence in college students to see if there is a significant correlation. These findings will give support to the question: Does emotional intelligence have an impact on a college student's academic achievement? I hypothesize that emotional intelligence will have a medium effect size with grade point average.

Methods of Study #1

Protocol

In order to conduct this meta-analysis, I used the PRISMA method suggested by Liberati and colleagues (2009). The PRISMA method presents a flowchart through the different phases of systematic research (Liberati et al., 2009).

Eligibility Criteria, Information Sources, and Search

The first step is identification of records through a search database, which in the case of this analysis was PsycINFO. The next steps are screening and eligibility. I selected the criteria based on the information I would need to do the analysis as well as making sure I selected up-to-date data. The eligibility criteria included a measure of the Bar-On EQ-i, a measure of GPA, must be measuring college students, and must be published at the earliest in the year 2000. For my first search I used the keywords "EI" and "academic performance" and "college students" which yielded twenty-seven results (see Figure 1). Twenty-five were excluded for reasons

including not meeting the eligibility criteria listed above, as well as being written in Spanish and having a duplicate record. For my second search I used the keywords “emotional intelligence” and “GPA” and “college students.” This yielded forty-one results, of which thirty-nine were excluded for not meeting the eligibility criteria. This leads to the last step in the PRISMA flowchart, which is included records. I ultimately found four records that covered all the eligibility criteria.

Data Collection Process and Data Items

By using a spreadsheet, I recorded all necessary information from each eligible article to conduct the meta-analysis. I recorded the author names, year published, sample size with gender, mean or range of age of participants, location of study, emotional intelligence mean, grade point average mean, Pearson’s r , and significance level (see Table 1). It is important to note that this meta-analysis was not restricted to the United States, so GPA reporting can differ across countries although they are measuring the same construct.

Risk of Bias in Individual Studies

One potential source of bias comes from the sampling method of certain studies. Many participants were selected through convenience sampling, meaning oftentimes these students were psychology students. It is possible there could be a cohort effect from these students, such as a higher emotional intelligence score after learning these concepts in class.

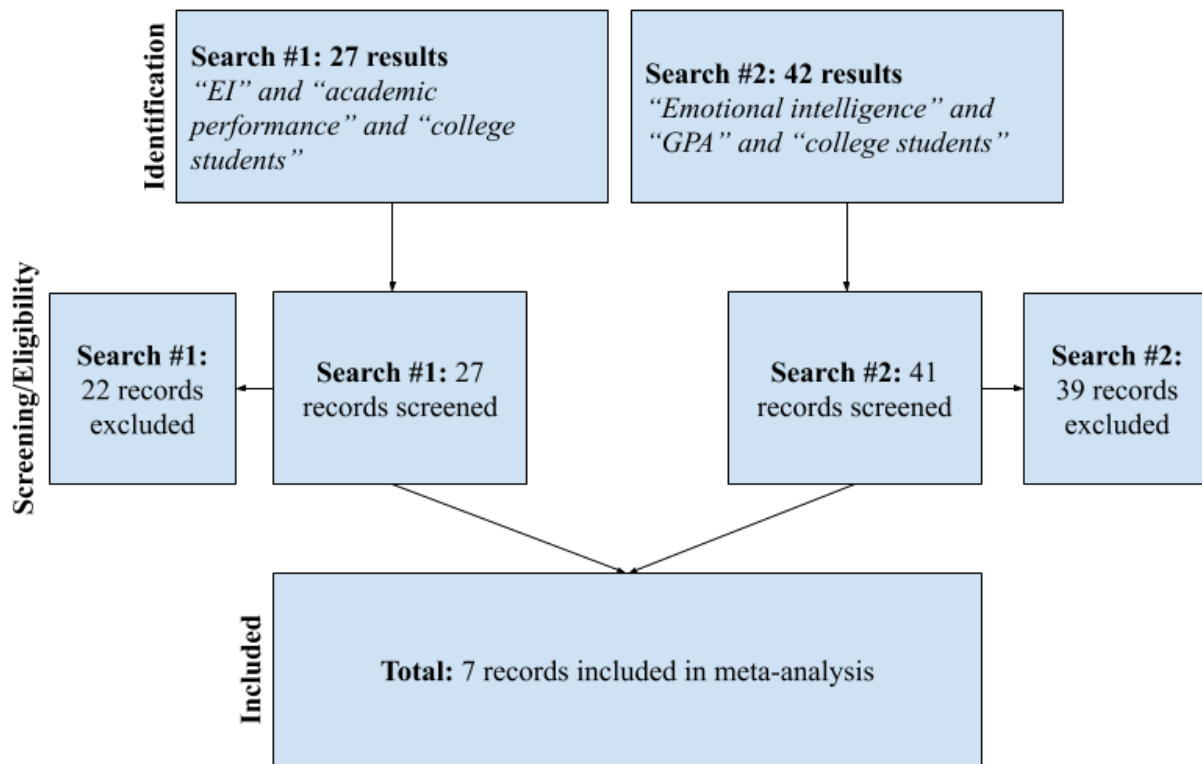
Summary Measures and Synthesis of Results

The measures used to conduct this meta-analysis were sample size (N) and Pearson’s r correlation. The results are reported in effect size and confidence interval. To conduct the meta-analysis, I used the Exploratory Software for Confidence Intervals (ESCI) 2016 for meta-analysis.

Additional Analyses

Following the initial analysis, I decided to conduct several additional analyses to further investigate non-cognitive predictors of college academic performance. One consideration I had was that the different emotional intelligence tests may not ultimately be measuring the same constructs. Therefore I analyzed only the Bar-On Emotional Quotient Inventory. I chose to look into the Bar-On EQ-i because it was present in the most number of studies in this meta-analysis. Following this analysis, I also analyzed the Big Five factors of personality, which I will discuss in study 2.

Figure 1



Results

Study Selection and Characteristics

For this meta-analysis, 7 records were included and analyzed using the random effects model. Overall, 1,853 participants included ranging from 17 to 56 years old. Thirty-nine percent were male participants and sixty-one percent were female participants. Table 1 shows the synthesized characteristics of the records.

Table 1

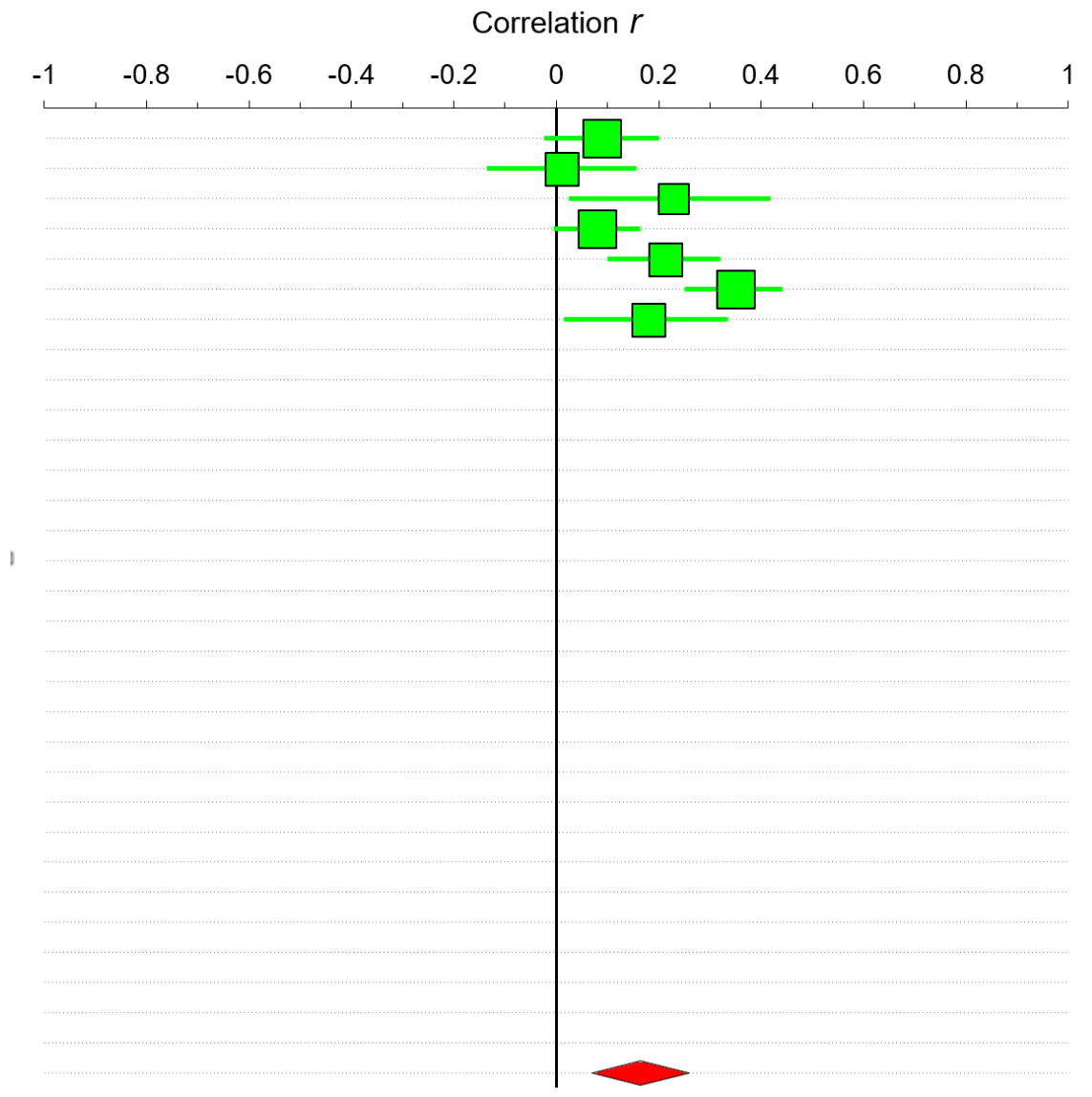
Study #	Authors	Year Published	N (gender)	Age	Location	EI Measure	EQ Mean	GPA Mean	Pearson's r
Study #1	Garg, Levin, and Tremblay	2016	299 (86 male, 213 female)	R=17-23	Laurentian University, Canada	EQ-i ^a	90.52	73.09	0.09*
Study #2	Newsome, Day, and Catano	2000	180 (62 male, 118 female)	R=17-56	Canadian university	EQ-i ^a	100.7	2.5	0.01*
Study #3	O'Connor and Little	2003	90 (53 male, 37 female)	R=18-32	Midwestern university	EQ-i ^a	95.73	2.75	0.23**
Study #4	Ahmad and Rana	2012	529 (201 male, 328 female)	R=18-21	Lahore, Punjab	EQ-i ^a	364.5	2.8	0.08*
Study #5	Ahmad	2011	291 (96 male, 195 female)	M=19.15	Pakistan university	EQ-i ^a	352.4	2.58	0.213****
Study #6	Sanchez-Ruiz, Mavroveli, and Poulis	2012	323 (210 male, 113 female)	M=23	Cyprus	TEIQ ^b	4.78	7.51	0.35*****
Study #7	Thomas, Cassidy, and Heller	2016	141 (27 male, 114 female)	-	Midwestern university	SEIS ^c	7	3.36	0.18**

* Not significant; **Significant at $p < .05$; ***Significant at $p < .01$; ****Significant at $p < .001$; *****Significant at $p < .001$; ^aBar-On Emotional Intelligence Inventory; ^bTrait Emotional Intelligence Questionnaire; ^cSchutte Emotional Intelligence Scale

Synthesis of Results

For the meta-analysis of emotional intelligence and GPA, the effect size was $r = .165$ with a 95% CI [.07, .26]. Because the CI does not include zero, we can conclude that there is a significant positive relationship between emotional intelligence and GPA. Figure 2 shows a forest plot of the meta-analysis.

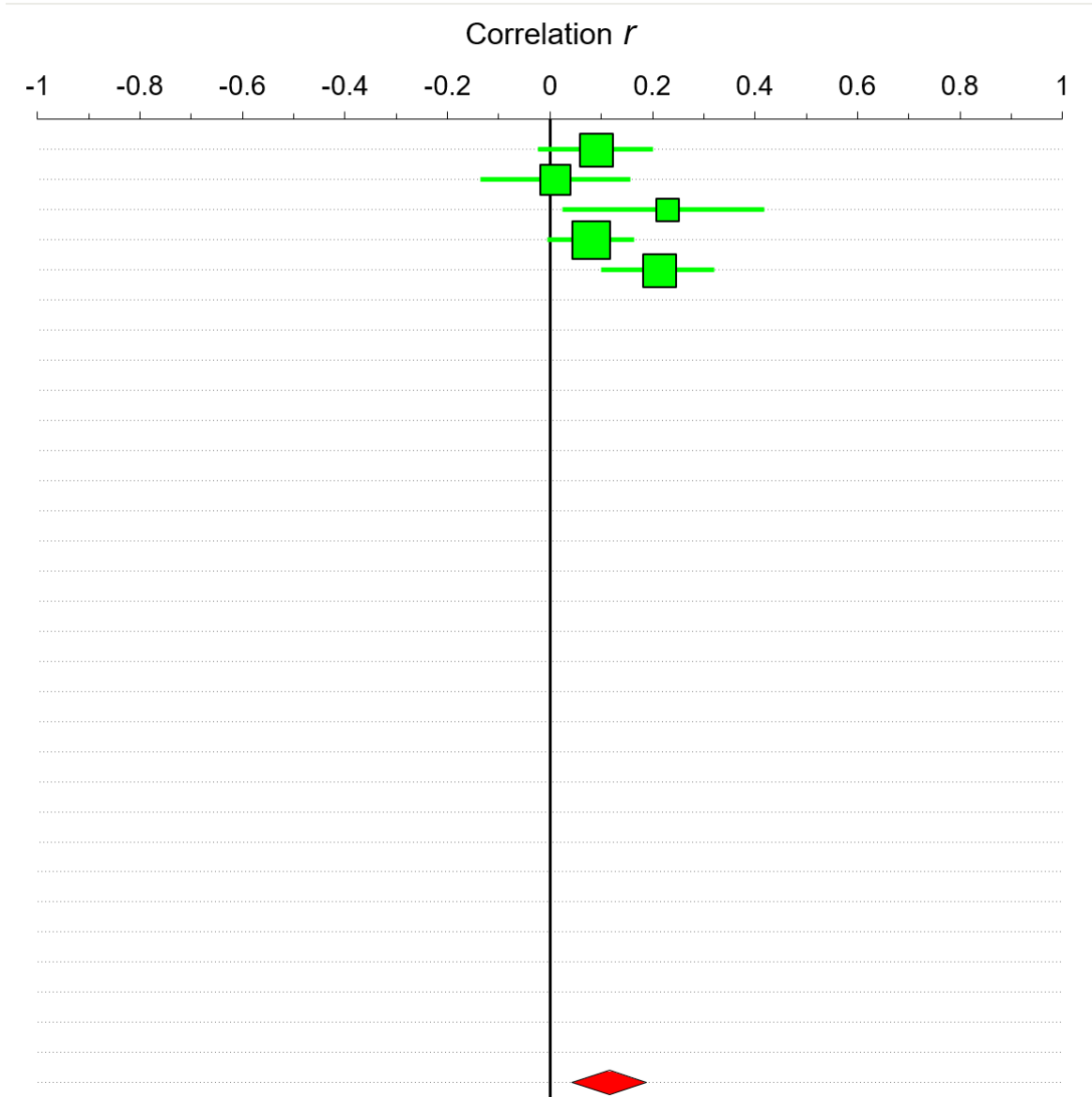
Figure 2



Additional Analysis

An additional analysis was run on only the studies that included the Bar-On EQ-i. The effect size was $r = .115$ with a 95% CI [.042, .189]. Therefore, across the five studies, there was a small positive significant relationship found between Bar-On EQ-i score and GPA. Figure 3 shows a forest plot of this additional analysis.

Figure 3



Discussion of Study #1

Summary of Evidence

The main findings of this meta-analysis showed that there is a small effect size for the emotional intelligence on grade point average according to Cohen's standards (1988). There may be a few reasons these findings do not support my original hypothesis that there would be a medium effect size. After the first meta-analysis, I considered the Bar-On EQ-i was measuring a different construct than the Schutte Emotional Intelligence Scale or the Trait Emotional Intelligence Questionnaire. Therefore I conducted an additional meta-analysis that only included the studies that included the Bar-On EQ-i. This led to an even smaller effect size suggesting that the Bar-On EQ-i is not a valid predictor of academic performance.

This is relevant information for college student, higher education professionals, and higher education educators. While emotional intelligence may not predict academic performance it may be related to adjustment to college. Garg, Levin, and Tremblay found that emotional intelligence and grade point average were not significantly related, but that emotional intelligence had a positive, significant relationship with university adjustment (2016). At a university level, if administrators are interested in retention they should not focus of academics alone but also emotional intelligence. If students are able to successfully adjust to the university atmosphere, then it is probable to assume that they will be retained through their college career.

Limitations

One limitation of this meta-analysis is that it did not include a look into the sixteen factors included in the Bar-On EQ-i. This may have given more insight as to which parts of emotional intelligence are most related to academic performance. Another limitation of this study is that academic performance was only operationalized as grade point average. While GPA is an important aspect of college student academic performance, there may be other ways to measure academic performance.

Introduction of Study #2

Rationale

In the process of searching for articles through the PsycINFO database, I noticed that many studies looked into the Five-Factor Model suggested by Costa and McCrae (1992). The Five-Factor Model of Personality is one of the most validated measures of personality (Baker et al., 2004; Muck, Hell, and Gosling, 2007; Yoon, Schmidt, and Ilies, 2002). The five factors of this model are openness, conscientiousness, extraversion, agreeableness, and neuroticism (also referred to as emotional stability).

In finding a small effect size from emotional intelligence, I considered whether personality was a separate psychological factor that influences academic performance. I noticed a pattern as I read these articles that a combination of high conscientiousness and low neuroticism often led to higher grade point average (Ahmad and Rana, 2012).

Objectives

In this second meta-analysis, I wanted to find the relationship between personality and academic performance in college students. If emotional intelligence is a psychological component that does not have a large effect on academic performance, I wanted to see if another psychological component does. I hypothesized that there would be a medium effect size between conscientiousness and grade point average as well as a medium effect size between neuroticism and grade point average. My hypothesis was in line with previous research by Ahmad and Rana (2012).

Methods

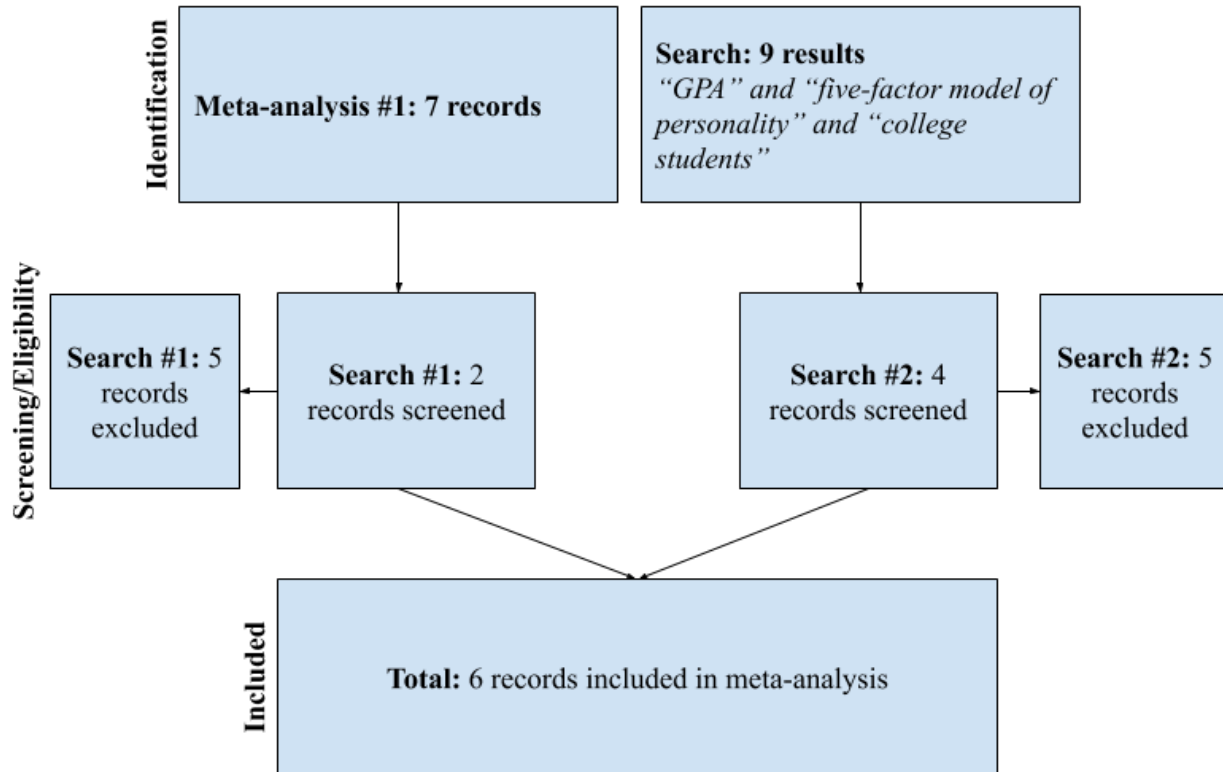
Protocol

In order to conduct this meta-analysis, I used the same method as in the first meta-analysis, which is the PRISMA method suggested by Liberati and colleagues (2009).

Eligibility Criteria, Information Sources, and Search

I identified articles from the first meta-analysis as well as articles from an additional search on the PsycINFO database. The eligibility criteria included a measures from the Five-Factor Model, a measure of GPA, must be measuring college students, and must be published at the earliest in the year 2000. From the first meta-analysis, two records were used. For my search I used the keywords “GPA” and “five factor model of personality” and “college students” which yielded nine results (see Figure 4). Five were excluded for reasons including not meeting the eligibility criteria listed above. I included seven records that covered all the eligibility criteria.

Figure 4



Data Collection Process and Data Items

Using a spreadsheet, I recorded all necessary information from each eligible article to conduct the meta-analysis. I recorded the author names, year published, sample size with gender, mean or range of age of participants, location of study, each factor mean, grade point average mean, Pearson's r , and significance level (see Table 2). It is again important to note that this meta-analysis was not restricted to the United States, so GPA reporting can differ across countries although they are measuring the same construct.

Summary Measures and Synthesis of Results

The measures used to conduct this meta-analysis were sample size (N) and Pearson's r correlation. The results are reported in effect size and confidence interval. To conduct the meta-analysis, I used the Exploratory Software for Confidence Intervals (ESCI) 2016 for meta-analysis.

Results*Study Selection and Characteristics*

For this meta-analysis, 6 records were included and analyzed using the random effects model. Overall, 1,502 participants included ranging from 18 to 24 years old. Forty-six percent were male participants and fifty-four percent were female participants. Table 2 shows the synthesized characteristics of the records.

Table 2

	Authors	Year Published	N (gender)	Age	Location
Study #1	Ahmad	2011	291 (96 male, 195 female)	M=19.15	Pakistan university
Study #2	Sanchez-Ruiz, Mavroveli, and Poulis	2012	323 (210 male, 113 female)	M=23	two English-speaking universities in Cyprus
Study #3	Komaraju et al.	2011	308 (147 male, 161 females)	R=18-24	Southern Illinois University
Study #4	Wang, Cullen, Yao, and Li	2013	291 (129 male, 108 female)	M=18.34	China
Study #5	Ridgell and Lounsbury	2004	140 (76 male, 64 female)	M=19.18	large southeastern state university
Study #6	Okun and Finch	1998	240 (38 male, 202 female)	M=18.34	-

Table 3

<i>Information Study Individual (continued) – Five-Factor Meta-analysis</i>												
	GPA Mean	OPEN ^a Mean	OPEN ^a r	CON ^b Mean	CON ^b r	EXT ^c Mean	EXT ^c r	AGR ^d Mean	AGR ^d r	NEU ^e Mean	NEU ^e r	
Study #1	2.58	38.6	0.16**	41.8	0.02*	39.4	0.14**	-	-	-	-	-
Study #2	7.51	10.33	0.26**	9.75	0.19**	8.93	0.13**	9.4	0.12*	8.87	0.19**	*
Study #3	-	-	0.13**	-	0.29**	-	0.07*	-	-	-	-	0.0*
Study #4	3.07	-	-	4.31	0.25**	5.42	0.03*	-	-	-	-	-
Study #5	-	-	0.06*	-	0.15*	-	0.04*	-	0.1*	-	-	0.13*
Study #6	-	5.37	-0.09*	5.81	0.2***	5.39	-0.03*	6.23	0.05*	4.52	0.04*	0.04*

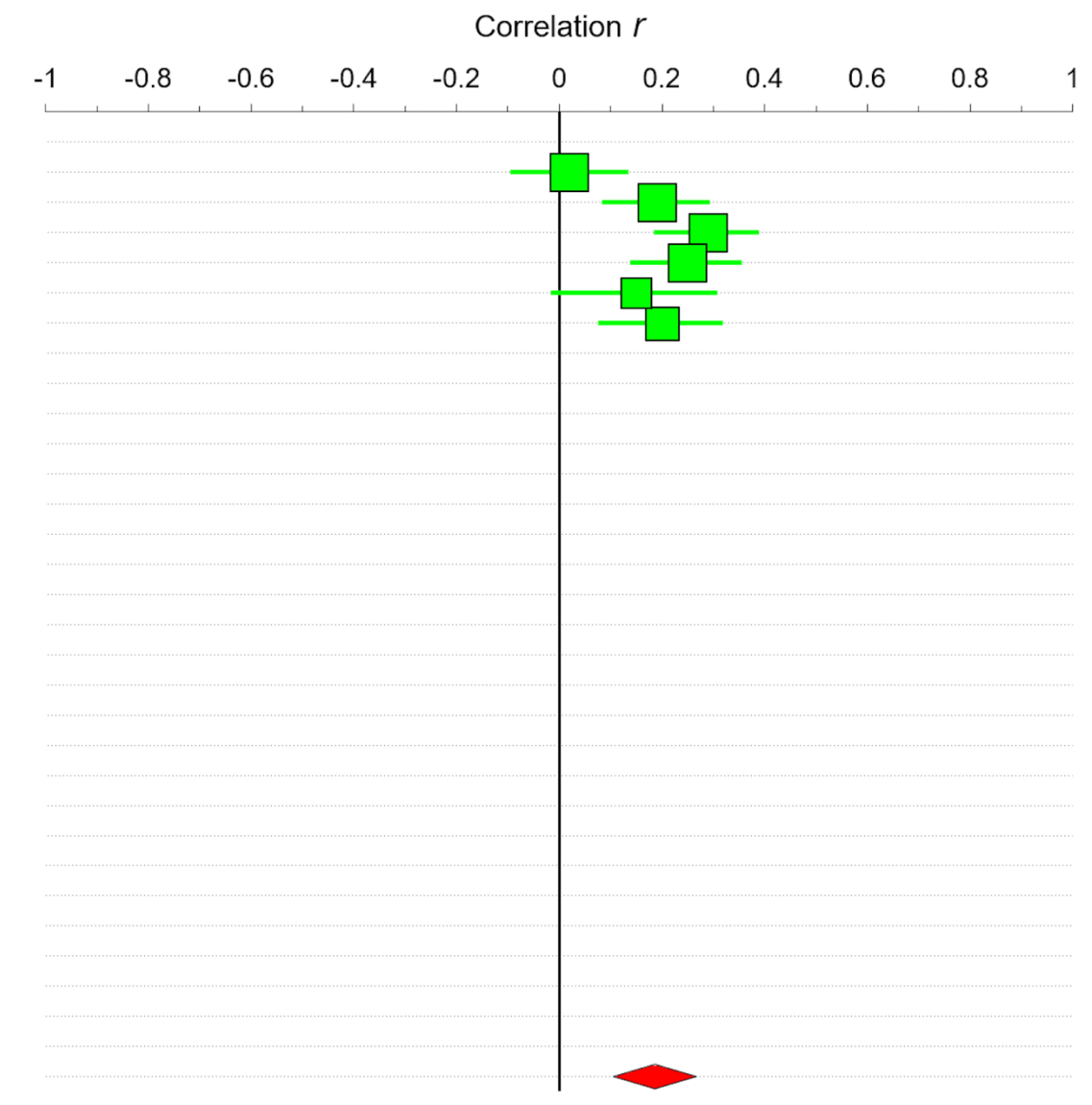
Not significant; **Significant at p<.05; *Significant at p<.001; ****Significant at p<.001; ^aOpenness; ^bConscientiousness; ^cExtraversion; ^dAgreeableness; ^eNeuroticism*

Synthesis of Results

For the meta-analysis of the relationship between openness and GPA, the effect size was $r = .109$ with a 95% CI $[-.009, .227]$. For the meta-analysis of the relationship between conscientiousness and GPA, the effect size was $r = .186$ with a 95% CI $[.105, .268]$. For the meta-analysis of the extraversion and GPA association, the effect size was $r = .068$ with a 95% CI $[.025, .11]$. For the meta-analysis of the agreeableness and GPA correlation, the effect size was $r = .129$ with a 95% CI $[.054, .205]$. For the meta-analysis of the neuroticism and GPA correlation, the effect size was $r = .089$ with a 95% CI $[-.005, .183]$. Table 4 shows a synthesis of these results. Figure 5 shows a forest plot of the conscientiousness meta-analysis.

Table 4*Synthesis of Five-Factor Meta-analysis Results*

	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Effect Size	.109	.186	.068	.129	.089
Confidence Interval	$[-.009, .227]$	$ [.105, .268]$	$ [.025, .11]$	$ [.054, .205]$	$ [-.005, .183]$

Figure 5

Discussion of Study #2

Summary of Evidence

The largest effect size within this meta-analysis was with conscientiousness. According to Cohen's standards, this is still a small effect size (1988). Although I anticipated that conscientiousness would have the largest effect size between the five factors, my findings did not

support my hypothesis that it would have a medium effect size. There may be a few reasons why my findings did not support my hypothesis. One reason is that there is likely an interaction between personality traits, emotional intelligence factors, and grade point average. I did not perform any interaction analyses, so I do not know if interaction has an effect across studies. For example, Ahmad and Rana found that there was interaction of low neuroticism and high emotional intelligence that led to a higher grade point average. As in the previous meta-analysis, there also may be bias that comes from convenience sampling.

Limitations

One limitation of the meta-analysis was that I did not study any interaction effects. Considering constructs like intelligence and personality are very complex, it is probable to assume that there is significant of interaction between all of these factors.

Overall Conclusions

While the effect size was small, there is still an effect of emotional intelligence and conscientious. There are likely many other components that make up the construct of academic performance. Future research should look into additional non-cognitive components that could make up academic performance. The first meta-analysis included a variety of emotional intelligence inventories, which all may be measuring different constructs. Further research should look into the convergent validity of the various emotional intelligence inventories. The second meta-analysis included five factors of personality that all may have interaction effects with GPA. Further research should study the interaction of personality traits on academic performance. Finally, it is important to note that academic success is not the same construct as personal success. While academic success may make up personal success in a college student's

life, there are many other factors that universities can focus on that would improve retention rate as well as the personal success of college students.

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