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## How Grit and Resilience Predict Successful Academic Performance

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### ABSTRACT

Predicting student success and preventing dropout are crucial efforts for higher education institutions. Many indicators are used to predict retention and performance such as high school GPA, SAT scores, and individual personal factors. Grit and resilience are two such individual factors useful in helping identify characteristics of successful students, although they have sparked much debate. For this longitudinal study, college students' resilience score from the Effective Life-Long Inventory (ELLI) and the Grit test were used to predict cumulative grade point average. Resilience and Perseverance of Effort (POE), a subscale of the Grit test, were significant in predicting student performance. Efforts to improve retention and performance would benefit from interventions to build resilience and grit to help students be more aware of their strategies and overcome obstacles and thus prevent them from dropping out.

Key words: persistence, student success, grit, resilience, ELLI, academic performance

### Introduction

#### How Grit and Resilience Predict Successful Academic Performance

College success is important for individual and family sustainability. Education reduces disparities in income, resources, and health for individuals and their families (Zajacova & Lawrence, 2018). According to the National Student Clearinghouse, in 2014 around 29 million students dropped out of college and only 13% enrolled again over the next five years (Cooper, 2019). Predicting student success and preventing dropout are crucial efforts for higher education institutions to help those who come to college with different skill sets and resources.

Students drop out of college for many reasons including financial, social, academic preparation, and family issues (Azmitia et al., 2018). High school GPA and SAT scores often predict college success although individual personal factors are considered important predictors

as well (Akos & Kretchmar, 2017; Baier et al., 2016; Cazan & Truta, 2015; DeBerard et al., 2004; Koretz, et al., 2016; Yu, 2017).

### **Grit and Resilience**

While questions of terminology abound, Duckworth and Yeager (2015) suggested that “non-cognitive” factors influence student performance. The term “cognitive” refers to “ability and knowledge constructs that can be reliably measured by standardized intelligence and achievements tests” (West et al., 2016, p. 149). “Noncognitive”, in contrast, is a somewhat misleading term given that all such processes are cognitive in nature. However, for our purposes, noncognitive refers to processes that affect performance enabled by the cognitive processes but are not specific to so-called intelligence and achievement (Duckworth & Yeager, 2015; West et al., 2016).

Both grit (Duckworth et al., 2007) and resilience (Edwards et al., 2016; Masten, 2018) have been identified as personal, “noncognitive” factors associated with academic persistence and success. Grit is defined as “perseverance and passion for long-term goals” (Duckworth et al., 2007, p. 1087). Grit has two components: “consistency of interest [COI] and perseverance of effort [POE]” (Akos & Kretchmar, 2017, p. 165). Resilience is defined as the “capacity to adapt successfully to significant challenges” (Masten, 2018, p. 16). The concept of resilience is derived from the literature on recovery from disasters and has been associated with prior adverse experiences. Resilience is said to mediate between stressors and life satisfaction (Cazan & Truzan, 2015). These concepts are similar in that they both lead to long-term gains, one through continuing effort (grit) and the other by managing when the path forward contains obstacles (resilience).

### **Characteristics related to Grit and Resilience**

Much has been written about whether grit and resilience are useful in helping identify characteristics of students who succeed academically. Some authors have questioned whether the concepts, particularly grit, are distinct enough from more established ones, the so-called “jangle fallacy” (Credé et al., 2017) and whether their measures have construct validity and predictive value (Credé et al., 2017; Fong & Kim, 2019; Muenks et al., 2017).

Grit has been related to the concepts of conscientiousness and self-control but is defined as more sustained over time compared with the other two (Akos & Kretchmar, 2017). Muenks et al. (2017) found that there was overlap among grit and personality and behavioral characteristics such as “effort regulation, cognitive self-regulation, and engagement” (p. 616), making it difficult to determine whether grit is a separate concept or merely another term for similar constructs.

With respect to academic performance, Weisskirch (2018) found that students’ grit scores did not relate to either predicted or actual grades in a class. Self-esteem, instead, was a significant factor in students’ ability to predict a grade and, combined with students’ reported use of general learning strategies, predicted their score on the POE subscale of grit.

Deakin Crick et al. (2015) considered resilience to be part of a larger learning system which includes internal factors, such as creativity and critical curiosity, and external factors, such as social organizations and politically determined curriculum. Resilience, as measured by the Effective Lifelong Learning Inventory (ELLI), is considered the opposite of fragility and

dependence, and has to do with the ability to overcome setbacks (Deakin Crick & Xu, 2008). “Dependent and fragile learners more easily go to pieces when they get stuck or make mistakes. They are risk-averse. Their ability to persevere is less, and they are likely to seek and prefer less-challenging situations” (Deakin Crick & Xu, p. 2008, p. 391).

Fong and Kim (2019) argued for the need to consider “academic buoyancy” which they identified as the ability to manage “chronic and acute academic adversities” (para. 9). They suggested that students’ academic buoyancy may apply more appropriately to typical academic challenges. Moreover, Martin and Marsh (2009) argued that academic buoyancy is more episodic or limited in scope, both in terms of intensity of the challenges as well as timeframe. Additionally, they stated that resilience is reactive whereas buoyancy is proactive, with the focus on keeping on top of work rather than having to react to difficult circumstances. However, Fong and Kim (2019) found that grit, based on the Grit-S measure (Duckworth & Quinn, 2009), an 8-question short version of the Grit test, predicted academic achievement beyond what academic buoyancy and a measure of future time perspective together could account for.

Given these findings, it appears that both grit and resilience have some support to be considered distinct concepts, adding to the understanding of individuals’ persistence and success in their endeavors. Kannangara et al. (2018) indicated that it is imperative that research pinpoint the relationship between grit and resilience and how they contribute to academic success. They cited one source that found a negative correlation between grit and resilience although this is an unpublished master’s thesis and so further research is warranted. In contrast, Karaman et al. (2019) found that the Grit-S translated into Spanish had a similar positive relationship to a resilience measure as did the English version.

### **Grit, Resilience, and Academic Success**

Academic success has two main outcomes: retention and performance. Whether students finish a challenging course or complete their degree are measures regarding retention. A grade in a particular course, semester grade point average (GPA), or cumulative GPA average are measures of performance.

The Grit test has mixed results in terms of its predictive ability for student success (Akos & Kretchmar, 2017; Weisskirch, 2018). The POE factor predicted GPA better while COI predicted career choice and major change of adults better (Akos & Kretchmar, 2017). The Grit-S total score predicted reaching the final round of a spelling bee and retention of West Point cadets better than either subscale alone (Duckworth & Quinn, 2009).

Hodge et al. (2018) examined how grit related to student reports of their academic performance and their grade in a course. They found that grit was related to increased engagement, which was defined as a combination of “vigour, dedication, and absorption” (p. 452). Engagement was found to mediate the link between grit and academic productivity, suggesting that those students who rated themselves as higher in grit were more likely to push forward and engage in their studies and thus perform better.

West et al. (2016) showed that students’ self-reports of grit are likely affected by “reference bias” meaning that the students’ ratings of themselves are influenced by their perceived comparison group. They found that students in a high-achieving school may see themselves less positively compared to those in a lower-achieving school. Thus, students assess their own abilities in relation to those around them, and their assessment may affect how they

engage academically depending on whether they see themselves as more capable than others. If students perceive that others are more able than themselves, they may expect less of themselves and be less likely to persist than if they feel they are more capable than those around them.

Research on resilience shows similar results in that students' self-perceptions influence their sense of how they can persist and overcome challenges. Cazan and Truta (2015) described resilient students as ones who perceive stressors as less problematic and are better able to manage challenges. Frazier et al. (2018) found that students who perceived that their stressors were greater and reported having fewer resources to manage those stressors were more likely to have lower GPAs. They also reported they were less able to cope with the stressors and were less resilient in the face of adversity.

Johnson et al. (2015) discovered an indirect effect of perceived resilience on student academic performance. Those who perceived themselves as more resilient were more likely to use "regulatory strategies" which included time management, self-regulation, and effort-regulation behaviors.

Thus, students who score higher on grit or resilience measures tend to believe that, with more effort or continued persistence, they can succeed and thus, are more likely to activate behaviors that lead to future success. They may attribute their success more to internal characteristics and be less daunted by failures. They may have more of a growth mindset whereby they believe they can make changes in themselves, rather than a fixed mindset that leads them to a static approach to learning (Dweck, 2007). Thus, it may be that the characteristics of grit and resilience influence the outcomes for students less directly and more as a result of other factors such as self-esteem, and behaviors such as self-regulated behaviors and course-related activities.

### **Purpose of this Study**

The purpose of the current study is to examine the role of grit and resilience for students' academic success. This study is part of a larger effort looking at student persistence and dropout over time. We looked at students close to the beginning of their academic careers and plan to follow them until they graduate or drop out. We want to see if measures of grit and persistence can predict who will make it in their academic program and who will switch or drop out. We expect that grit and resilience scores may change and that some students will learn that they can succeed, creating a growth mindset and others may have factors such as financial or family that make completing their degree difficult at this time. The current study is a preliminary analysis of the measures of grit and resilience that were employed at the beginning of the study and how well they predict students' academic performance.

Research questions:

Can academic success, indicated by cumulative GPA, be predicted using grit and resilience measures? Do these measures suggest that the concepts of grit and resilience are distinct from each other?

## Hypotheses

For this study, the following are the hypotheses:

1. Grit and Resilience factors will be distinct from each other (H1).
2. Those with higher Persistence of Effort (POE) and Consistency of Interest (COI) will have higher cumulative GPAs (H2).
3. Those with higher levels of resilience will have higher cumulative GPAs (H3).
4. Resilience, POE and, COI will contribute separately to explaining the variance in cumulative GPAs (H4).

## Methods

IRB approval was obtained for the longitudinal study across three campuses of a large, multi-campus university in the northeastern United States.

### Study Design

The larger study began in Fall 2018 and will continue until students complete their degree or leave the university. The current study is a quantitative analysis of data comparing Grit and Resilience scores from the beginning of Fall 2018 (Time 1; T1) with students' cumulative GPA at the end of Summer 2019 (Time 2; T2).

### Participants and Procedure

Students at three campuses of a multi-campus university were recruited for this study. Those who provided informed consent had their data included in the study. Participants were asked to complete the ELLI and the Grit test at T1. Cumulative GPA were collected at T2.

### Measures

#### *Demographics.*

After receiving informed consent information, participants completed a form providing information regarding the following demographic factors: age; gender; major; number of credit hours completed and whether they had completed credits at another university or college; commuter status; personal relationship status; whether they family responsibilities; parents' education level; family income; and the number of hours of employment per week. See Table 1 for the summary of the demographic information.

#### **Effective Life-Long Inventory (ELLI)**

The ELLI (Deakin Crick et al., 2004; Shaffer et al., 2018) is a 72-question inventory that participants completed online after receiving an email invitation. It measures seven factors: creativity, changing and learning, critical curiosity, learning relationships, meaning making, resilience, and strategic awareness. For the purposes of this study, only the resilience measure, formerly known as the inverse of fragility and dependence, was used for the comparison of the grit and resilience factors. Cronbach's alpha for the fragility and dependence measure was reported as ranging from .71-.81 (Deakin Crick & Xu, 2008). See Table 2 for sample questions.

#### **Grit.**

The Grit test (Duckworth et al., 2007) includes six questions identified as measuring POE and six as measuring COI. Participants indicated whether each statement was "very much like me", "mostly like me", "somewhat like me", "not much like me", and "not like me at all". See

Table 2 for sample questions. The Grit subscale scores were calculated as a sum of the total points for the six statements. Cronbach's alpha for these scales are POE = .71, COI = .70, compared with the Duckworth et al. (2007) alpha scores of POE = .78 and COI = .84.

## Results

### Analysis Plan

Initially the ELLI subscales and Grit total and subscales were examined to ensure that assumptions about normality were met. Bivariate relationships were examined to ensure linearity, no outliers and no multicollinearity between predictors in the later regression models, the latter determining that Hypothesis 1 was supported. Since Grit total is made up of two scales and thus it was highly correlated with both the POE (.79) and COI (.84) scores, it was not included in the regression analysis with individual subscales.

Means, standard deviations, and bivariate correlations for the Grit subscales and Resilience measure are presented in Table 3. Results of the bivariate correlation indicated statistically significant positive relationships between cumulative GPA and the Grit POE score ( $r(108) = .34, p=.000$ ) and a trend between cumulative GPA and the Grit COI score ( $r(108) = .17, p=.071$ ) supporting Hypothesis 2, and between cumulative GPA and the Resilience score ( $r(108)=.38, p<.0005$ ) supporting Hypothesis 3.

A multiple regression was calculated to predict cumulative GPA based on Resilience, POE, and COI score. Hypothesis 4 predicted that the independent factors of Resilience, POE, and COI would account for a statistically significant amount of variance in cumulative GPA. The standardized regression for this work is:

$$Y_{gpa} = \beta 1X \text{ Resilience}T1 + \beta 2X \text{ POE } T1 + \beta 3X \text{ COI } T1 .$$

A significant regression was found ( $F(3, 108)=7.86, p<.0005$ ), with an  $R^2$  of .18,  $R^2\text{Adjusted} =.16$ . Resilience and POE were both significant predictors of cumulative GPA. As shown in Table 4, the results of the multiple regression showed that COI did not independently predict cumulative GPA, thus Hypothesis 4 was only partially supported.

## Discussion

Success in college, both in terms of degree completion as well as achievement of higher grades, requires a long-term commitment to achieving one's goals. Grit and resilience are factors associated with success in the long term since those with higher levels of each are more likely to persist even when confronted with challenges. Research on these characteristics has questioned how they are associated with future success as well as whether they are truly distinct from other factors that had previously been explored such as conscientiousness and self-control (Credé et al., 2017; Muenks et al., 2017). The current study explored the relationship between grit and resilience, using two commonly used measures, and how they predict future academic success, measured in this case using cumulative GPA.

The results from this study suggest that the abilities of overcoming obstacles and maintaining effort are associated with academic success. Given that grit and resilience retain their distinctive, independent roles in the outcome, this supports the first hypothesis. While both Grit subscales, POE and COI, and the ELLI-Resilience measure are individually correlated with cumulative GPA, the strongest predictors are POE and Resilience. Support of the second and third hypotheses dovetails nicely with the regression. For the fourth hypothesis that all three

measures would be independent predictors of GPA, only the POE Grit subscale and the Resilience measure, but not the COI subscale are indicated as significant predictors. In other words, there is unique predictive validity of part of Grit and resilience in this outcome.

These findings support the notion that both grit and resilience are distinct factors that can aid students in succeeding in their academic endeavors. The concept of persistence of effort is thus related to how much one pushes ahead and works towards long-term goals. The concept of resilience, from the perspective of the ELLI (Deakin Crick et al., 2004; Deakin Crick & Xu, 2008) framed as the opposite of fragility and dependence, is more focused on managing one's ability to overcome obstacles. It seems that while there is overlap in these two factors, there is enough distinction to warrant relying on both for research on student success.

Previous research on resilience has shown that those students who are considered more resilient employed more measures to assist themselves in their endeavors (Johnson et al., 2015). Thus, it is not just that they have a sense of being able to succeed; they also do more to ensure that they will succeed. It would be expected, therefore, that students who had higher resilience scores also had higher GPAs since they would engage in practices aimed at ensuring their success. Thus, it is not enough to say that resilience alone will lead to academic success or will do so in a direct manner, but one must consider that resilience may be a moderator leading to this success.

The second subscale of the Grit test, COI, on the other hand, appears to focus more on whether individuals become distracted by other projects over time or finish what they have started. It may be that the COI subscale is able to predict different aspects of student behavior such as changing majors or schools. College is a time where students are encouraged to explore, and so consistency of interest may vary depending on when it is measured during their college experience and what their major is. Since some of the participants in this study are bachelor's degree students and others are associate degree students, there may be varying degrees of consistency of interest in some of these groups. This may be particularly true for those who had to commit to a major from the outset of their degree program (e.g., Physical Therapist Assistant program students) compared with those able to explore their options early in their academic careers (e.g., Human Development and Family Studies students), whose interests therefore may change over time.

### **Limitations**

Given that cumulative GPA was used as the measure of academic success, the results of this study focus more on the ability to do well in classes rather than the long-term achievement of goals, at least at this point in the research project. Later it may turn out that grit supersedes resilience in terms of finishing school whereas resilience has to do with improved performance. Thus, the results may be limited by the timing of when the snapshot is being taken within the study itself.

One problem with using cumulative GPA is that early GPA affects the cumulative one. For students in some majors, courses that are "weeders", such as Anatomy and Physiology, which function as gatekeepers are often taken early in a program and can have a significantly negative impact on GPA. Thus, cumulative GPA may be front-loaded with difficult courses and so whether the first-year grades or cumulative grades end up predicting later performance remains to be seen.

While past research (Akos & Kretchmar, 2017; Duckworth et al., 2007; Hodge et al., 2018) has also used cumulative GPA to indicate academic success, there are other factors associated with academic retention and performance. These include immigration status (O'Neal et al., 2016), social integration, race, and ethnicity (Perrakas, 2008; Pulliam & Gonzalez, 2018), and first-generation college student-status (Broda et al., 2018). Therefore, GPA tends to reflect numerous influences which complicates how it reflects the notion of academic success.

Additional limitations of this study relate to measurement issues for the instrument used to identify resilience. In this study and others using the ELLI (Deakin Crick et al., 2004; Deakin Crick & Xu, 2008), it is difficult to examine very closely the questions since it is proprietary and not available to be looked at in its entirety. It is not possible, therefore, to determine completely how the concepts of grit and resilience are different. While the Grit scales are available to analyze and have been extensively (Credé, et al., 2017; Fong & Kim, 2019; Muenks et al., 2017), resilience measures are less uniformly used and available for close examination.

### **Future Direction**

As indicated earlier, academic success is divided into two main components: retention and performance, with this study focused on performance as measured by cumulative GPA. Future studies will expand this perspective and examine how student retention, or persistence, is related to grit and resilience.

As the Consistency of Interest (COI) subscale suggests, part of grit is determined in connection with one's persistence in a certain area. While it may be important to persist when things get tough, it may also be important to re-evaluate and potentially switch fields when the student becomes aware of a poor fit with their major. Thus, persistence may be negative if it leads a student to continue in an area that will not work over the long term. Examining students' reasoning for switching to a new field may be illuminating. Determining whether students find another major that is suitable for them or whether they drop out of college altogether would further the understanding of what persistence means in these situations. It is beyond the purview of this study to follow students after they drop out of school, but it would be expected that some would find a better fit in the working world and not return to college while others may drop out temporarily and then return having more success. Thus, while it will be good to examine whether students change majors, stay in school, and eventually graduate, it is important to note that dropping out of college may not be maladaptive in the long run.

In terms of whether grit and resilience change, comparisons of students' scores of both factors at the beginning of the study and then later the same year and into future years will be examined. Some participants in the study have now completed the ELLI up to four times and so it will be determined if there is some consistency over time for them or if there is an upward trend or something else entirely.

It is also important to explore how resilience and grit may be enhanced in students who are at risk. Shaffer et al. (2018) found that students who were encouraged to reflect upon their learning strategies as indicated by their ELLI scores increased their scores. It may be that employing a specific training model may be useful in helping students develop the ability to overcome obstacles and thus prevent them from dropping out. As this conclusion is being written during the time of the coronavirus pandemic of 2020, it is particularly important to understand the factors that aid and serve as barriers for student academic success. Learning how to help

students develop additional grit and resilience and manage in difficult times is imperative to student and institutional success.

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**Table 1. Demographic information for the sample  $N=126$ ,  $n$  (%)**

Age	18-20 98 (77.7)	21-30 26 (20.6)	31+ 2 (.2)	
Gender	FEMALE 82 (65.1)	MALE 43 (34.1)	OTHER 1 (.01)	
Major	HDFS <sup>a</sup> 33 (26.2)	Forestry 28 (22.2)	PTA <sup>b</sup> 33 (26.2)	OTHER <sup>c</sup> 49 (38.3)
Race/ethnicity	EA <sup>d</sup> 100 (79.3)	B/AA <sup>f</sup> 8 (6.3)	Multiple 9 (7.1)	OTHER 9 (7.1)
Semester at PSU	1-2 62 (49.2)	3-4 44 (34.9)	5-6 17 (13.4)	7 3 (2.4)
Commuter	YES 71 (42.1)	NO 55 (43.7)		
Parent1 education	Less/HS/GED 42 (33.3)	Some College 15 (11.9)	College degree 53 (42.1)	Grad degree 13 (10.2)
Parent2 education	Less/HS/GED 53 (42.1)	Some College 20 (15.8)	College degree 39 (30.9)	Grad degree 7 (5.5)
Employment	Under 20 hrs/week 20 (15.8)	20-41+ hrs/week 54 (42.3)	Not employed, looking 12 (9.5)	Not employed, not looking 31 (24.6)
Family obligations	NO 92 (73.0)	Siblings 25 (19.8)	Children 4 (3.2)	Parents or grandparents 3 (2.4)

Family income	\$49K and under 24 (19.0)	\$50K-\$99K 35 (27.8)	\$100K+ 20 (15.9)	Unknown or no answer 42 (33.3)
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Footnotes: a=Human Development and Family Studies, b =Physical Therapist Assistant, c = other includes Nursing, Health Policy & Administration, d=European American, e=Black/African American

**Table 2. Sample questions for Resilience and Grit measures**

Measure	Subscale	Sample question
ELLI	Resilience	When I have trouble learning something, I tend to get upset.
		When I have to struggle to learn something, I think it's probably because I'm not very bright.
		When I'm stuck I don't usually know what to do about it.
Grit	Consistency of Interest (COI)	New ideas and projects sometimes distract me from previous ones.
		I have been obsessed with a certain idea or project for a short time but later lost interest.
		I often set a goal but later choose to pursue a different one.
		I have difficulty maintaining my focus on projects that take more than a few months to complete.
		My interests change from year to year.
	Perseverance of Effort (POE)	I become interested in new pursuits every few months.
		Setbacks don't discourage me.
		I am a hard worker.
		I finish whatever I begin.
		I am diligent.
		I have overcome setbacks to conquer an important challenge.
		I have achieved a goal that took years of work.

**Table 3. Correlations, Means, and Standard Deviations of the cumulative GPA after Summer 2019 with the predictors (N = 108)**

Variable 1 2 3 4

*Correlations*

1. Cumulative GPA-after SU 19
2. Resilience T1 .38\*\*
3. Persistence of Effort T1. .34\*\* .43\*\*
4. Consistency of interest T1.17.30\*\* .36\*\*

*Distribution Estimates*

*M* 3.29 56.16 24.019.4

*SD* .50 13.47 3.03.5

\*\*  $p < .01$ , \*  $p < .05$

**Table 4: Hierarchical Ordinary Least Squares Regression Model Estimating Resilience, Persistence of Effort T1 (POE) and Continuity of Interest T1 (COI) independent impact upon or prediction of Cumulative Grade Point average at the end of Summer 2019 (GPA) 11 months later**

Variables	B	SE	$\beta$
Resilience Time 1	.01	.003	.26 **
Persistence of Effort Time 1	.03	.02	.21 **
Consistency of Interest Time 1	.01	.01	.04
(Constant)	1.90	.35	
<i>F</i>	7.86***		
Adjusted $R^2$		.16 **	

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## Biography

Robin Yaure, Ph.D., CFLE, is Professor of Teaching, Human Development and Family Studies. She coordinates the HDFS and Psychology programs at Penn State Mont Alto. Her research focuses on examining well-being, teaching and learning, and infant sleep. She teaches family development and research methods and supervises student interns.

Elise Murowchick, Ph.D., CFLE, trained in Human Development and Family Studies, Biopsychology, and Health Psychology, is an instructor in the Seattle University Department of Psychology where she pursues research that includes child and adolescent health, risk behaviors, and well-being and research on teaching and learning.

Jackie Schwab, Ph.D. is an associate professor of Human Development & Family Studies at Penn State Mont Alto. She received her baccalaureate degree from San Diego State

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Lauren Jacobson earned a Ph.D. in Human Development and Family Studies in 1994 from Penn State. She is currently an Associate Professor of Teaching at Penn State Altoona, where she serves as the HDFS Program Coordinator and Academic Internship Supervisor. Her research interests focus on adolescents, athletics, and self-development.

Renee Borromeo, Professor of Teaching in Physical Therapy, earned a master's degree in Physical Therapy from Stanford University and a Clinical Doctorate in Physical Therapy from Shenandoah University. She is the Professor in Charge of the Physical Therapy Assistant Programs at Penn State University.

A. Patricia Aguilera-Hermida, D.Ed., is Assistant Teaching Professor of Human Development and Family Studies at Penn State Harrisburg. Her research has most recently focused on topics related to older adults such as intergenerational relationships, education for older adults, ageism, community well-being, and strategies to promote cognitive health.