A CASE STUDY OF THE CHARACTERISTICS FOR SUCCESSFUL FIRST TIME PASSING OF THE NATIONAL PHYSICAL THERAPY EXAM IN THE UNIVERSITY OF NEW MEXICO DOCTOR OF PHYSICAL THERAPY 2012-2017 COHORTS

Beth-Anne Moody Jones

University of New Mexico

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A CASE STUDY OF THE CHARACTERISTICS FOR SUCCESSFUL FIRST TIME PASSING OF THE NATIONAL PHYSICAL THERAPY EXAM IN THE UNIVERSITY OF NEW MEXICO DOCTOR OF PHYSICAL THERAPY 2012-2017 COHORTS

by

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DISSERTATION

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Education
in Educational Leadership

The University of New Mexico
Albuquerque, New Mexico

July 2018
DEDICATION

I would like to dedicate this to my children who have given me many things, but especially:

- The inspiration to dream and excel,
- All their love and support, and
- A purpose and meaning to my life.

Eric Palmer Jones,
Forrest Alexander Jones,
Trevor Knapp Jones, and
Maggie Caitlin Jones.
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ABSTRACT

A CASE STUDY OF THE CHARACTERISTICS FOR SUCCESSFUL FIRST TIME PASSING OF THE NATIONAL PHYSICAL THERAPY EXAM IN THE UNIVERSITY OF NEW MEXICO DOCTOR OF PHYSICAL THERAPY 2012-2017 COHORTS

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Not passing the National Physical Therapy Exam (NPTE) has significant consequences. If a student does not pass the NPTE on the first attempt they can retake the examination, however a student may only take the examination a maximum of three times in any 12-month period and, effective as of January 2016, there is a 6-time lifetime limit on NPTE attempts. Individual state boards have ultimate regulatory oversight on retakes and/or remediation. In the state of New Mexico, there is an in-depth remediation program.

The purpose of this study was to look at multiple variables that were presented as potential factors for success (admissions criteria, within program testing, hidden curriculum, personality traits such as grit and mindset, age and timeframe from undergraduate degree and race/ethnicity) to determine their impact on successful first time passing of the NPTE within the case boundaries of the University of New Mexico DPT 2012-2017 cohorts.

This study was a programmatic evaluation intrinsic case study design bounded with one physical therapy program over a six-year span. This study underlined the
important characteristics of admissions and the curriculum, as well as student
c characteristics, that may lead to successful first time passage of the NPTE. Through study
of the quantitative measures that were accessible, such as admissions criteria and
cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as
well as qualitative aspects of students who were both successful and not successful in
their first attempt at the NPTE, the potential predictors of success that may frame
admissions policies and within curriculum policies are discussed.
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Chapter 1

Introduction

Physical Therapy graduate education is unique from other types of doctoral education, such as an EdD or PhD curriculum. In the EdD and PhD programs, a student attends classes, sits for a comprehensive examination, successfully defends a research dissertation, and then the student can make use of the degree through obtaining employment or conducting research. In the Doctor of Physical Therapy (DPT) curricula, in order to be deemed a successful candidate for licensure as a Doctor of Physical Therapy and therefore be employed as a physical therapist, the student must not only pass and complete three years of didactic and clinical course work, (including passing a comprehensive cumulative examination in some programs) but they also must pass the National Physical Therapy Exam (NPTE), a comprehensive examination that is regulated by an entity outside of the curriculum of the school. The NPTE tests the students on all aspects of the didactic and clinical curriculum and is taken within ninety days of graduation or after completion of the physical therapy program. While programs can regulate their own curricula following the accreditation standards set by a national regulatory body, the Commission on Accreditation in Physical Therapy Education (CAPTE), they do not have access to, nor have any control over, the actual NPTE. This lack of connection to the ultimate end stage of whether or not a physical therapy student eventually gets to actually practice as a physical therapist is much like the student in law who must eventually pass the bar to practice law. This makes it challenging for programs to know how to adapt their curriculum to ensure that those students who actually matriculate will eventually become physical therapists. Because of this lack of control
over the end stage examination, it behooves all programs to work diligently to admit, and then support, candidates who are able to successfully navigate through the physical therapy curriculum. Identifying criteria needed for successful completion of the curriculum is the first step in that process.

In addition to needing students to eventually pass the NPTE in order to practice Physical Therapy, DPT accreditation standards also require that each program achieve a certain yearly and overall percentage of graduates passing the exam. The requirement states that the ultimate licensure NPTE pass rates are 85% when averaged over 2 years (Artis, 2016a). In addition to tracking ultimate passage rates, the first-time passage rates are also tracked and recorded nationally and are available in the public domain. It can be assumed that DPT programs work to offer a curriculum that ensures that students are prepared to pass this examination on the first attempt.

The NPTE is a high stakes examination, not only because it determines who will or will not get a license, but also in its actual cost to sit for the exam. After completing three years in the curriculum, as well as meeting all the pre-requisites needed to get into the program, failing this examination is psychologically and financially devastating for any student. The examination is offered only four times a year. If a student fails the exam, they are not permitted to work with a temporary PT license and must wait approximately three months before they can sit for the examination a second time. This means, that if after graduating from an accredited program a student has accepted a position as a physical therapist and then does not pass the exam, according to our licensure standards, they are either reduced to the level of an aide at their new place of employment or terminated from their position (New Mexico Physical Therapy Board,
CHARACTERISTICS ASSOCIATED WITH FIRST TIME PASSING OF THE NPTE

2016). Their pay is often reduced and the burden of losing one’s stature in their place of employment is immeasurable. In addition, “any applicant who fails the NPTE two or more times must complete and submit proof of completion of remedial work as recommended by the board” (see Appendix A) (New Mexico Physical Therapy Board, 2016). Applicants have a limit of three retakes per year and a lifetime limit of 6 attempts at passing the NPTE (NMPTB, 2016).

At the University of New Mexico (UNM), it is not unheard of for students to complete the three years of the curriculum and never actually obtain a license to practice. When that occurs, the student has failed to successfully become a physical therapist, which ultimately is also a failure of the program’s mission to educate physical therapists to provide healthcare for the State of New Mexico. To help meet the accreditation standards, and to decrease any financial and psychological burden that occurs from not passing the NPTE, the University of New Mexico program strives for as close as possible to 100% passage of the NPTE on the first attempt. Preparing students for this success is therefore the ultimate goal and challenge.

Physical Therapy Education Standards

The standards of physical therapy education have been changing rapidly. Physical therapy education started as a certificate program in the early 20th century. By the 1950’s the entry-level requirement moved to a bachelor’s degree. Master’s degree programs began as early as the 1970’s, however it was not until the 1990’s that most programs converted from a bachelor’s entry-level requirement to a master’s entry-level requirement (Moffat, 1996; Plack, 2002). In 2001, the University of New Mexico (UNM) was one of the later entry-level bachelor’s program to convert to the entry-level master’s (MPT).
The class of 2003 was the first master’s trained class to graduate from UNM. At the same time, the majority of other physical therapy professional programs across the United States were already beginning the transition to the Doctor of Physical Therapy (DPT) as the standard for entry-level education (Plack, 2002). As outlined in Figure 1, the peak for the number of master’s entry-level programs hit in 2000 (>150) and then quickly declined as more and more programs transitioned to an entry level DPT (Artis, 2016b). By 2003, when UNM graduated its first MPT class, there were already close to 100 programs in the US that were offering an entry-level DPT. As of 2015, there are only DPT level entry level programs in the US (Artis, 2016b).

Figure 1. Number of accredited programs by the degree offered 1979-2016 (Artis, 2016b).

Understanding the characteristics of students who successfully navigate the curriculum and pass the NPTE would be beneficial. Characteristics found in admissions criteria are one part of the puzzle and have been studied at the bachelor’s entry-level (Balogun, 1988; Balogun, Karacoloff, & Farina, 1986; Roehrig, 1988), master’s entry-level (Dillon & Tomeka, 2010; Dockter, 2005; Thieman, Weddle, & Moore, 2003) and doctoral entry-level (Riddle, Utzman, Jewell, Pearson, & Kong, 2009; Utzman, Riddle, & Jewell, 2007). With the quick change in entry-level for physical therapy professional
programs, admissions criteria have also changed from looking at ACT scores to reviewing GRE scores, and looking at undergraduate cumulative GPA vs high school or first year undergraduate GPA as benchmarks for admissions (APTA, 2004; Artis, 2016a). In addition, with the change in entry-level and the changes in the practice of physical therapy, the NPTE has also changed to keep up with contemporary practice with the last substantive change in 2018 and a previous test content update in 2013 (“NPTE Development,” n.d., sec. NPTE Development, para 3) Because of the variances in the timing of these studies, the previous information is difficult to generalize to the current entry-level doctoral candidate.

The formal, or intended, curriculum, under the leadership of CAPTE and the APTA, is likely a large part of a graduate’s success. The Normative Model of Physical Therapy Education in 1997 was the first consensus driven professional education model for physical therapy education (APTA, 2004). With the changes in the profession, the normative model has had three revisions (APTA, 2004). The University of New Mexico used the normative model standards to prepare for the accreditation process in 2005 and 2015. When UNM changed its entry-level to the DPT in 2009, the 2004 normative model was the impetus for all formal curriculum changes (APTA, 2004). The normative model is currently undergoing an additional revision for future publication.

The intended curriculum teaches physical therapy students the necessary skills to practice as a physical therapist. All students attend classes and hear the same lectures, see the same skills instructed and yet not all students do as well on the NPTE. Health professional education, realizing this dichotomy in its graduates, began looking at other components of the curriculum that might be influencing the profession (Hafferty, 1998).
In the early 1990’s, medicine first began the conversation related to other curricular components of the educational journey. The idea that there might be a hidden curriculum, or culture, related to medical education was certainly not a novel idea but for the first time someone had given that idea a name and linked it to professional health education (Hafferty, 1998). There is very little literature concerning the hidden curriculum in physical therapy education (Dutton & Sellheim, 2014). This may affect student success on the NPTE and deserves further study.

Research has shown that personality traits, including mindset, can predict academic success (Grehan, Flanagan, & Malgady, 2011; Rattan, Savani, Chugh, & Dweck, 2015). Much of the research makes use of the Big Five model of personality (Conscientiousness, Openness to Experience, Agreeableness, Extraversion, and Neuroticism) found in the Revised NEO (Neuroticism-Extraversion-Openness) Personality Inventory (NEO-PI-R) and the NEO Five-Factor Inventory (NEO_FFI) from Psychological Assessment Resources (Grehan et al., 2011). The literature on conscientiousness talks about motivation and that the “conscientious individual who is organized, hardworking, and achievement-oriented, is more likely to be motivated to perform well and will display higher academic performance than a person who is not” (Grehan et al., 2011, p. 318). The authors spoke of “receptiveness to new ideas…and intellectual curiosity” (Grehan et al., 2011, p. 319), all of which may have an effect on successful navigation of the UNM DPT program and the NPTE.

Academic mindset may also be a factor in student success from elementary to graduate school (Rattan et al., 2015; Walton & Cohen, 2011). Academic mindset has two components. The first relates to a student’s fixed or growth mindset and the second
relates to if a student has a sense of belonging to the school or academic field (Rattan et al., 2015). Exploring if mindset of the students who attend the UNM DPT program has an effect on eventual NPTE success might help in determining characteristics of success.

Another factor, grit, has recently been looked at as a possible reason for people’s ability to attain long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). “Grit entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity and plateaus in progress” (Duckworth et al., 2007, pp. 1087–1088). The gritty individual pursues a given goal over a period of years. Grit may be “as essential as IQ to high achievement” (Duckworth et al., 2007, p. 1089). The Grit Scale, a self-report questionnaire, was developed and validated in a 2007 study (Duckworth et al., 2007). The researchers found that grit “accounted for more variance in outcomes than commonly observed for the Big Five Conscientiousness” factors (Duckworth et al., 2007, p. 1098). Evaluation of grit as a possible source of success in terms of students’ ability to pass the NPTE on the first try may be of interest.

Learning styles are certainly factors in how a student navigates a curriculum and may have a link to the success of that student (Busato, Prins, Elshout, & Hamaker, 2000). Learning styles, such as the Kolb inventory, have been used by many programs to assist a student in understanding their learning style and therefore understand potential learning strategies for success (Kolb, 1984). The Kolb learning style inventory (LSI) is the most widely accepted learning style model (Manolis, Burns, Assudani, & Chinta, 2013). The Kolb inventory is thought to be a valid and stable assessment of learning strategies (Metallidou & Platsidou, 2008; Richardson, 2011). The UNM DPT program has been
tracking its students’ learning styles throughout the last decade. There is a possibility that there is a correlation between success on the NPTE and learning style.

It is clear that not all students attain the same results on the NPTE. It is possible that the “hidden” curriculum is a component of the conundrum of trying to understand what makes one student successful over another (Hafferty & O’Donnell, 2014). Possibly there are other unidentified components of personality or emotional intelligence of the candidate (Conard, 2006), learning styles or even grit and perseverance of the student (Duckworth et al., 2007) that also should be considered.

Physical Therapy Program at the University of New Mexico

First time pass rate. One of the accreditation standards requires that the program track and report the first time and ultimate pass rates on the NPTE (Artis, 2016a). An example of the type of data the UNM PT program submits to CAPTE and the results from the first six DPT graduating classes are displayed in Table 1. As outlined, with the first two graduating classes, UNM did not meet the ultimate 85% average over 2 years. To help meet these accreditation standards, the program strives for as close to 100% passage of the NPTE on the first attempt.
Table 1

National Physical Therapy Examination First Time Pass Rate for the University of New Mexico DPT program (2012-2017) n=167, with 166 Taking the Exam and 152 Passing on Their First Try

<table>
<thead>
<tr>
<th>Class</th>
<th>Number of Graduates</th>
<th>Total taking exam</th>
<th>First time Pass</th>
<th>1st time rate</th>
</tr>
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<tr>
<td>2012</td>
<td>25</td>
<td>25</td>
<td>21</td>
<td>84%</td>
</tr>
<tr>
<td>2013</td>
<td>26</td>
<td>26</td>
<td>21</td>
<td>81%</td>
</tr>
<tr>
<td>2014</td>
<td>29</td>
<td>29</td>
<td>27</td>
<td>93%</td>
</tr>
<tr>
<td>2015</td>
<td>29</td>
<td>28</td>
<td>26</td>
<td>93%</td>
</tr>
<tr>
<td>2016</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>100%</td>
</tr>
<tr>
<td>2017</td>
<td>28</td>
<td>28</td>
<td>27</td>
<td>96%</td>
</tr>
</tbody>
</table>

Not passing the NPTE has significant consequences. If a student does not pass the NPTE on the first attempt they can retake the examination, however a student may only take the examination a maximum of three times in any 12-month period and, effective as of January 2016, there is a 6-time lifetime limit on NPTE attempts (New Mexico Physical Therapy Board, 2016). Individual state boards have ultimate regulatory oversight on retakes and/or remediation. In the state of New Mexico, there is an in-depth remediation program, outlined in Appendix A (New Mexico Physical Therapy Board, 2016).

The State of New Mexico lists Physical Therapists as a 5-Star occupation with annual openings of 60 positions and an annual median wage of $84,560 (Bussey, 2016). The New Mexico Health Care Workforce Committee was planning a detailed report on the shortage of physical therapists in the upcoming annual report for 2017, but it was not
included in the annual report released in October 2017 (Larson, 2016, 2017). It can be surmised given the openings available for physical therapists within the state of New Mexico that there is a need for more physical therapists within the state. Given this potential shortage of health care providers in the State of New Mexico, topped with having a small number of graduates in each cohort (n = 30), any student having difficulty is a problem not only for the student but also for general medical care to the New Mexico community. There is certainly an expectation that the UNM DPT program assist in addressing this shortage by graduating candidates who not only pass the rigorous standards of the program but who also successfully pass the NPTE. Trying to match these needs to the information we have in our admissions applications is a growing dilemma.

**Admissions criteria.** Admission to a physical therapy doctoral program is highly competitive and widely sought. In the 2015-2016 admissions cycle, the University of New Mexico (UNM) had 386 applicants for 30 slots. Nationally, in 2014-2015, the mean applicant total per program was 472 with 41 eventually enrolled (Artis, 2016b). Creating a rubric that identifies the most qualified student who has the professionalism and academic prowess to succeed is a challenge every year. In previous cycles, UNM has admitted students who have failed and been dismissed, students who have struggled in clinic and been dismissed, students who struggled throughout the program and eventually struggled to pass the NPTE and students who never sat for the NPTE at all.

The recent physical therapy admissions literature suggests that undergraduate grade point average (uGPA), prerequisite grade point average (pGPA), verbal Graduate Record Examination (vGRE) and quantitative Graduate Record Examination (qGRE) scores are the best predictors of success on the NPTE (Coleman-Salgado & Barakatt,
2018; Kosmahl, 2005; Nuciforo, Litvinsky, & Rheault, 2014; Utzman et al., 2007). In addition, students that have academic difficulty during their time in the physical therapy doctoral program may also have difficulty with first time pass success on the NPTE (Riddle et al., 2009). Performance on the NPTE has been connected to academic difficulty within master’s entry level programs as well (Dockter, 2005; Thieman et al., 2003).

**Race and equity.** There have been numerous studies identifying the effect of race related to standardized test-taking skills (Alexander, 2016; Alexander & Morgan, 2016; Clawson & Page, 2011; Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York, 1966; Goodlad, Mantle-Bromley, & Goodlad, 2004; Ravitch, 2013; Rury, 2016; Tierney & Duncheon, 2015). Not surprisingly, people of color, other than white/non-Hispanic candidates, had difficulty with passing the NPTE (Riddle et al., 2009). Table 2 illustrates how UNM stands in comparison to the national data taken from the CAPTE fact sheet (Artis, 2016b). Included are the mean and median data when given. For the “% minority, class size and GPA of enrolled students” variables, I used the “Public Institution” data to compare similar programs to UNM, a public university. Because the UNM program is three years long and the class of 2012 was admitted in 2009, I used the aggregate admissions data for 2009 to compare the UNM DPT 2012 graduates and the aggregate admissions data for 2011 for the UNM DPT 2014 graduates.
Table 2

Aggregate Data Comparing National CAPTE Data of Public Institutions from the Admissions Cycle for the Classes of 2012 and 2014 with the DPT Program at UNM for the Classes of 2012 and 2014 for Graduation Rate, First time Pass Rate, Percent of Minorities, and GPA of Enrolled Students

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Sum of all degrees conferred</td>
<td>7998</td>
<td>25</td>
<td>8513</td>
<td>29</td>
</tr>
<tr>
<td>Graduation Rate</td>
<td>99% (median)</td>
<td>96%</td>
<td>94% (median)</td>
<td>96.60%</td>
</tr>
<tr>
<td></td>
<td>96.1% (mean)</td>
<td></td>
<td>91.9% (mean)</td>
<td></td>
</tr>
<tr>
<td>First time pass rate</td>
<td>90.9 (median)</td>
<td>84%</td>
<td>94% (median)</td>
<td>93%</td>
</tr>
<tr>
<td></td>
<td>87.7% (mean)</td>
<td></td>
<td>91% (mean)</td>
<td></td>
</tr>
<tr>
<td>Minority students enrolled</td>
<td>6.2 persons</td>
<td>10 persons</td>
<td>6 persons (mean)</td>
<td>7 persons</td>
</tr>
<tr>
<td>(Public)</td>
<td>(mean)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size (Public)</td>
<td>38.1 (mean)</td>
<td>26</td>
<td>39 (mean)</td>
<td>30</td>
</tr>
<tr>
<td>% minority (Public)</td>
<td>16.27% (mean)</td>
<td>38.50%</td>
<td>15.38 % (mean)</td>
<td>23.30%</td>
</tr>
<tr>
<td>GPA (mean) of enrolled students</td>
<td>3.6</td>
<td>3.49</td>
<td>3.6</td>
<td>3.59</td>
</tr>
<tr>
<td>(Public)</td>
<td></td>
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</tbody>
</table>

As evidenced in Table 2, the graduation rates for UNM match or exceed the National standard. In 2012, the UNM first time pass rate was below the mean. First time pass rates nationally have a skewed distribution to the left with a mean that is less than the median in both years. With the first-time pass rate, UNM was below both the mean and median of the national standard for the class of 2012. For the class of 2014, the first-
time pass rate fell between the national median and mean. UNM’s goal is to match, or be above the mean and median score if possible.

Where UNM varies meaningfully from the national trends is in the percent of minority students and the overall mean GPA of accepted students. In the 2012 cohort, the percentage of minority students was 38%, where the national mean was approximately 16%. Additionally, the UNM mean GPA was 3.49, below the national mean of 3.6 for that year. Given the literature that reports that people of color may have difficulty passing the NPTE on the first attempt, the diversity of the admitted student cohorts may be a possible source of difficulty with first time passing rates (Riddle et al., 2009). In addition, the mean undergraduate GPA is a predictor of success (Kosmahl, 2005; Nuciforo et al., 2014; Riddle et al., 2009) and the UNM cohort mean undergraduate GPA is currently lower than the national mean.

**STEP exams.** At the University of New Mexico, with the switch to the DPT curriculum in 2009 (the 2012 cohort), there was a class added to the curriculum entitled PT 683 Board Preparation class. This Board Preparation class required students to take a review course, sit for a national Practice Exam & Assessment Tool (PEAT) at the end of the curriculum, and pass the test with a certain level of proficiency (65%) in order to graduate.

Even with this Board Preparation class and the requirement of passing a national preparatory test, the program continued to have students who struggled with passing the NPTE on their first attempt (especially in 2012 and 2013). Given this information, in 2014 after the continued struggle to gain close to 100% passage on the first attempt at taking the NPTE as well as being below the national mean for passing rate, the program
instituted an additional requirement in the Board Preparation Class called the STEP 1 and STEP 2 exams. STEP 1 is given after the first year of the three-year curriculum and STEP 2 is given after the second year of the curriculum. Students are required to pass these tests with a 70% (5% below the national requirement for the NPTE passing) and must remediate the examination if they fail to pass it on the first try. The UNM program considers the PEAT exam, described previously, as the STEP 3 exam in the benchmark process. This exam has a 65% passing benchmark in order for the student to graduate from the program.

Research Questions

Given this information, my research questions were:

1. What are the relationships between NPTE scores/first time passing and the UNM admission criteria, age, gender, race/ethnicity, STEP scores, and PEAT score?

2. What are the potential areas of the curriculum that may be contributing to NPTE scores or students either passing or not passing the NPTE on first try?

3. Are there components of personality, grit or learning styles that may be contributing to the NPTE score and students either passing or not passing the NPTE on the first try?

Limitations

The generalizability of this information is limited. This is a case study of one DPT program in the United States with specific cohort characteristics. Generalizability of this information may be limited to only this program.
Delimitations

The Commission on Accreditation in Physical Therapy Education (CAPTE) dictates the standards for accreditation for all PT programs in the United States. Practice patterns gleaned from input from all physical therapists in the nation, as well as policy produced by the American Physical Therapy Association (APTA), determine these standards. Accreditation is for a maximum of 10 years at a time. The accreditation process requires a one-year, in-depth, self-study of the curriculum, the administration, facilities and environment. Following the self-study is an onsite visit with three to four experts who spend three days going over the self-study, interviewing stakeholders and visiting the facilities. Often, programs may have areas that are deemed weak or of concern that need to be addressed. When this happens, the program may be given a shorter accreditation period or they will be granted a period to respond to the deficits and be granted provisional accreditation. Without accreditation, students would not be eligible to sit for the NPTE, a necessity to apply for licensure. The DPT division at UNM underwent accreditation by CAPTE in 2005 and in 2015 and successfully passed the accreditation process without any deficits. To include an evaluation of the actual curriculum, including course content, goals, objectives, assessment, and pedagogy as well as the classes considered to be a part of the curriculum map beyond the scope of accreditation standards, is outside the scope of this study. Given this information, I have delimited the intended curriculum from this study and not made it a part of this study.

Conceptual Framework

There are multiple variables that impact this study, including a definitive timeline that involves six cohorts under study. To clarify the longitudinal aspects of this study, I have provided Figure 2 to give a global overview. There are criteria that occur prior to
admissions that the program does not control, such as the students’ GPA and their GRE scores. There are criteria that occur during enrollment in the program, such as the professional GPA and the hidden and informal curriculum. Overarching all these components are fixed impact variables that relate to the person such as age, race/ethnicity, gender, learning style and personality. All of these factors may be affecting the outcomes, the NPTE score, and first time pass rate.

**Figure 2.** Conceptual framework.

**Significance of the Study**

This study underlines the important admissions criteria as well as student characteristics that may lead to successful first time passage of the NPTE from graduates of the UNM physical therapy curriculum. Through study of the quantitative measures that are accessible, such as admissions criteria and cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as well as qualitative aspects of students who are both successful and not successful in their first attempt at the NPTE, I explored
the potential predictors of success that may frame admissions policies as well as themes related to the policies of the program (learning styles, internal support for learning), to reach the ultimate goal of having a graduate pass the NPTE on the first attempt.

I looked at the culture of the program through the hidden curriculum as well as the impact of learning style and personality, all areas that have not been studied in previous physical therapy literature. I found that qualitative interviews of graduates led to more insight about these variables that may have an impact on their success in the program and therefore their success on the NPTE. I conducted additional testing using the GRIT-s to seek further insight into what contributes to the success of the DPT students.

**Definition of Terms**

**American Physical Therapy Association (APTA).** A non-profit professional organization of physical therapists. Physical therapists voluntarily join this organization and pay dues. The APTA represents over 100,000 physical therapists, physical therapists’ assistants and students of physical therapy. The APTA regulates and advances physical therapy practice in the United States.

**Commission on Accreditation of Physical Therapy (CAPTE).** This is the agency that grants accreditation to entry-level physical therapy and physical therapist assistant programs. It is nationally recognized by the US Department of Education (USDE) and the Council for Higher Education Accreditation (CHEA)

**Doctor Physical Therapy (DPT).** The professional entry-level degree that is currently offered by all physical therapy programs in the United States. Students enter these programs having already completed an undergraduate bachelor’s degree.
Entry-level. The lowest level of education needed to be eligible to sit for the national board examination in physical therapy. Over time, entry level has changed for the physical therapy degree, going from a certificate, to bachelor’s level to eventually the doctorate level.

Federation of State Boards of Physical Therapy (FSBPT). This is the national board regulatory agent whose mission is “to protect the public by providing service and leadership that promote safe and competent physical therapy practice” (FSBPT, 2017, sec. Mission and Vision, para 2).

Grade point average (GPA). A number representing an average value of accumulated final grades in courses.

Graduate Record Examination (GRE). A standardized test given prior to attending graduate school. The test is comprised of verbal, quantitative, and written sections. Scores are used for admissions criteria to most graduate programs in the country.

GRIT-S. The short grit scale is an 8-item, self-administered test that provides insight into traits of perseverance and passion (Duckworth & Quinn, 2009).


Informal Curriculum. “The idiosyncratic, sporadic, and happenstance learning that occurs when a student asks questions after class” or has conversations with others when informal learning occurs (Hafferty & O’Donnell, 2014, p. 7).

Kolb Learning Inventory. A learning style inventory written in 1984 by David Kolb. This inventory is developed from an experiential theory and model of learning that was based in part from the contributions of John Dewey, Kurt Lewin, and Jean Paget. The learning style inventory is viewed as a continuum from concrete experience to reflective observation to abstract conceptualization and active experimentation. The inventory is a self-reflection tool that has people rank order ten items containing four sets of words that describe characteristics of the person filling out the form. The inventory gives an individual information on how they learn (Kolb, 1984).

National Physical Therapy Exam (NPTE). Examination with 250 multiple-choice questions (200 are graded and 50 are pilot questions for future administration of the exam) that tests competency of a graduate physical therapist to allow for the application of licensure.

Practice exam & assessment tool (PEAT). A practice examination developed by the Federation of State Boards of Physical Therapy that mirrors the NPTE. This is a timed, computer-based test using the same format and type of questions found on the NPTE. The PEAT gives a student immediate feedback with a detailed performance report by content area and systems. It also gives a student the rationale behind the correct answers and a list of references to use for further study (FSBPT, 2017).

STEP Exam. A comprehensive computerized high stakes multiple choice examination given at the end of the first and second year didactic curriculum at the University of New Mexico DPT program. The exam is a 200-item test that reflects the
information taught within that year of the curriculum. The individual exams are called STEP 1 and STEP 2 related to the year within the curriculum. Students must pass this exam with a 70% in order to continue in the curriculum. Students are allowed to repeat the test up to three times if unsuccessful at passing. The Step 1 and Step 2 exams are given on the same day at the end of the semester and are timed computer-based tests much like the NPTE and PEAT.
Chapter 2

Literature Review

Purpose and Research Questions

This study underlined the important admissions criteria and the curriculum, as well as student characteristics that may lead to successful first time passage of the NPTE in the UNM physical therapy curriculum. Through study of the quantitative measures that are accessible, such as admissions criteria and cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as well as qualitative aspects of students who are both successful and not successful in their first attempt at the NPTE, I explored the potential predictors of success that may frame admissions policies as well as look for themes related to the policies of the program (learning strategies, internal support for learning), to reach the ultimate goal of having a graduate pass the NPTE on the first attempt.

Given this information, my research questions were:

1. What are the relationships between NPTE scores/first time passing and the UNM admission criteria, age, gender, race/ethnicity, STEP scores, and PEAT score?
2. What are the potential areas of the curriculum that may be contributing to NPTE scores or students either passing or not passing the NPTE on first try?
3. Are there components of personality, grit or learning styles that may be contributing to the NPTE score and students either passing or not passing the NPTE on the first try?
Introduction

Through this review of the literature, I briefly look at the general components and evolution of the profession of physical therapy and the changes in educational standards that occurred simultaneously. I will then discuss the physical therapy accreditation standards for the curricula as well as the literature surrounding the hidden curriculum. I will examine standardized testing, as well as test taking and learning strategies along with benchmarks of success and the aspect of teaching a student how to take a high stakes examination. Additionally, I will report on the literature of personality traits related to emotional intelligence, mindset and grit. Lastly, I will address any gaps or implications of the literature as well as a review of the purpose and research questions.

The Evolution of Physical Therapy

Physical therapy (PT), along with its educational standards, has rapidly changed over its very brief history. While physical therapy as we know it today began about 100 years ago, the modalities of physical therapy can be traced back to Hippocrates in 460-355 BC (Wise, 2015, p. 2). Contemporary PT can trace its roots back to Europe in the 18th century with strong links to the bone setters and orthopedic physicians in Britain (Olson, 2016).

In the United States (US), in the early 20th century, women (mostly nurses) trained in massage, and physical education were brought in to work with patients (primarily children) with orthopedic issues. Multiple historical events occurred at this same time, including an onslaught of injured soldiers from the First World War and multiple citizens afflicted by the 1916 polio epidemic. The US, experiencing a void in healthcare rehabilitation, tasked Army General Major
Gorgas with studying European rehabilitation programs (Vogel, 2009). Based on this study in 1917, Major Gorgas established the Division of Special Hospitals and Physical Reconstruction and the profession of physical therapy was born in the US. Physical Therapists were known at that time as Reconstruction Aides (Vogel, 2009). The original reconstruction aides were trained in other academic fields and then underwent additional training at places like Walter Reed Army Hospital (Dreeben-Irimia, 2011; Vogel, 2009). The first school of physical therapy can be traced back to this military directive. After Walter Reed, another 14 schools quickly followed: The first was at Teachers College, Columbia University. The largest was at Reed College in Eugene, Oregon. Before the end of the war, the schools and colleges had trained almost 2000 women, about 300 of whom served overseas. (Bernard Becker Medical Library Digital Collection, 2004)

One of the first Army physical therapists was Mary McMillan. McMillan had trained as a physiotherapist in England under the orthopedic surgeon, Sir Robert Jones. She returned to the United States in 1915 to work at Children’s Hospital in Portland, Maine as Director of Massage and Medical Gymnastics (Le Postollec, 2000). By 1918, a prominent orthopedic surgeon in Boston recommended she join the army to oversee their Reconstruction Aide program (Dreeben-Irimia, 2011). She took over as the Supervisor of the Reconstruction Aides in 1919 at Walter Reed. By 1921 she had published the first educational book related to physical therapy in the US, *Massage and Therapeutic Exercise* (McMillan, 1929). McMillan is credited with helping create, in 1921, the first professional organization in physical therapy called the American Women’s Physical
Therapeutic Association. She was the first President of this association of approximately 274 members (Moffat, 1996). “In 1922, the association changed its name to the American Physiotherapy Association (APA) and men were admitted. In the 1930s, APA introduced its first "Code of Ethics" and membership grew to just under 1,000” (APTA, 2015, para 1). This professional organization is now known as the American Physical Therapy Association (APTA).

Physical Therapy was limited in its scope of practice for many years. Likewise, the education of physical therapists was limited. The following quote from Col. Emma Vogel describes what much of PT was like prior to the 1950’s:

Since physical therapy was a newcomer in the medical world, many ward surgeons preferred to prescribe the treatment to be given to their patients. In most instances, the medical director of physical therapy was not authorized to prescribe the modality to be employed, or to make changes in the progression from passive to active exercise, for example, without consulting the ward surgeon concerned with the case. This system had one advantage in that the ward surgeons often came to the clinic to observe their patients, and with each visit they became more interested in physical therapy. It had the disadvantage of preventing the director of physical therapy from exercising his initiative and medical judgment. By far the most time-consuming and the most popular form of physical therapy was massage which was prescribed for practically all patients. Unfortunately, its use was abused and often it was prescribed as a placebo. From records available, it appears that massage constituted about 40 percent of the total number of treatments administered while various types of exercise constituted only about 25
percent. Physical therapy measures were effectively used in the treatment of many conditions, but it was in the care of patients with orthopedic conditions and peripheral nerve lesions that it proved to be a most valuable adjunct. (Vogel, 2009, p. 47)

While the physical therapy profession grew in size, the practice of physical therapy, and thus the educational mission, did not change much from this directed therapy and paternalistic authority of medical physician to physical therapist until very recently (Moffat, 1996). Massage, along with other physical modalities and therapeutic exercise, was the foundation of the curriculum. Physical Therapists worked under “orders” requiring any small change in those orders to be approved by a physician before proceeding. There was very little autonomy in PT practice; it was a different time and place, and physical therapists were often used in a very technical way (Moffat, 1996).

By 1936, PT curricula went from the bedside certificate training of reconstruction aides prior to World War II to a four-year curriculum program that involved a two-year associate degree in either nursing or physical education followed by 24 months of PT curricula leading to a certificate in PT. Lacking the resources to establish the accreditation for themselves, the APA deployed the American Medical Association (AMA) for guidance and assistance (Moffat, 1996). “The AMA established the Essentials for an Acceptable School for Physical Therapy Technicians, and the first 13 institutions were accredited” (Plack, 2002, p. 49). According to Moffat, former President of the APTA, this relationship with the AMA “became fraught with multiple problems until we could extricate ourselves from the relationship 44 years later” (Moffat, 1996, p. 1244).
Many historical changes in health care began to transform the need for and expertise of physical therapists. With the outbreak of poliomyelitis in the 1950’s, the increased aging population and the institution of Medicare, physical therapy went from being a technician type position to a more problem solving and analytical profession. The educational standards attempted to keep up with the demands of the practice and therefore changed along with the profession.

**Entry Level Changes to Physical Therapy Education**

By the 1950’s, physical therapists began owning and working in independently run outpatient private practices, freeing themselves from the medical model of the hospital-based physical therapy seen in the previous half of the century (Moffat, 1996). In 1953, the Allied Health Professions Training Act was passed. This identified entry-level physical therapy to move from certificate level to baccalaureate programs (Moffat, 1996). In addition, the Physical Therapy Fund (now the Foundation of Physical Therapy) was created in 1957, promoting independent research associated with physical therapy (Moffat, 1996). All of these changes led to a wish to move from being a technician under the direct orders of a physician to being an autonomous practitioner, or professional.

To meet these changes, and with this birth of a professional vision for autonomous practice, the American Physical Therapy Association (APTA) started to exert control over educational standards in the early 1960’s (Moffat, 1996). There was a resolution in the APTA House of Delegates, which the AMA accreditation body adopted, stating that the bachelor degree must be the standard for all PT education. In 1977, the Council on Postsecondary Accreditation and the US Commissioner of Education granted recognition to APTA as an accrediting body, phasing out the AMA control over PT education. It took until 1983 for the AMA to step aside as the accreditation authority,
allowing CAPTE of the APTA to take over as the accreditation body for all physical therapy programs (Plack, 2002).

Once educational standards moved to CAPTE, entry-level requirements changed quickly. The master’s entry-level program began in 1979 but grew substantially in the 1980’s after the AMA was no longer the accrediting body. The first DPT entry-level program formed at Creighton University in 1995, a short 12 years after the accreditation change. In 2000, the APTA House of Delegates adopted Vision 2020 that stated in part that “the Doctor of Physical Therapy (DPT) is a clinical doctoral degree (entry-level degree) that reflects the growth in the body of knowledge and expected responsibilities that a professional physical therapist must master to provide best practice to the consumer” (APTA, 2015a, sec. Vision 2020, para 9). All programs in the United States now only offer an entry-level doctor of physical therapy curriculum.

Physical Therapy Curricula

**Accreditation criteria.** The Commission on the Accreditation in Physical Therapy Education (CAPTE) dictates the standards for accreditation for all PT programs in the United States. Practice patterns gleaned from input from all physical therapists in the nation, as well as policy produced by the American Physical Therapy Association (APTA), determine these standards. Accreditation is for a maximum of 10 years at a time. Often, programs may have areas that are deemed weak or of concern that need to be addressed. When this happens, the program may be given a shorter accreditation period or they will be granted a period to respond to the deficits and be granted provisional accreditation. Without accreditation, students would not be eligible to sit for the NPTE, a necessity to apply for licensure.
The CAPTE 2014 handbook (Artis, 2016a) has six student achievement outcomes by which it measures programmatic success. These can be found in the Standards and Required Elements for Accreditation of Physical Therapy Programs (Artis 2016a):

1. Graduation rates of at least 80% averaged over two years.
2. Ultimate licensure (National Physical Therapy Exam or NPTE) pass rates are 85% when averaged over 2 years.
3. Graduation rates and employment rates are at least 90% when averaged over two years.
4. That students demonstrate entry-level clinical performance as measured on the Clinical Performance Instrument (CPI).
5. The program graduates meet the expected outcomes of the individual program.
6. The program meets expected outcomes related to its mission and goals.

**Hidden curriculum.** Hidden curriculum, along with the intended (or formal) and informal curricula, is one of the three curricular spaces in health education programs (Hafferty & O’Donnell, 2014). The intended curriculum is the actual written curriculum and is demonstrated in syllabi, course objectives and competencies requirements. This intended curriculum is what is dictated by accreditation standards for physical therapy education; it is formulated by the normative model of physical therapy education (APTA, 2004). The informal curriculum is the “idiosyncratic, sporadic and happenstance learning” that occurs in the hallways, over lunch, or in advisement during faculty office hours (Hafferty & O’Donnell, 2014, p. 7). The hidden curriculum is the culture or the “ethos” of learning (Hafferty & O’Donnell, 2014, p. 7). It can include the social
atmosphere, professional associations of the faculty, the learning space, ceremonies, social media, social engagement, faculty interactions and the power differentials seen particularly within health care (Hafferty & O’Donnell, 2014, p. 8).

In Hafferty and O’Donnell’s text, *The Hidden Curriculum in Health Professional Education*, outlines that the hidden curriculum teaching occurs, in part, through interpersonal interactions between faculty, near-peers and peers and clinical instructors (Hafferty & O’Donnell, 2014, Chapter 11). There is also a component of hidden curriculum associated with student and department policies and the scheduling of classes. Ritual events, such as the UNM DPT program’s Induction Ceremony and the hooding ceremony at Convocation, are all thought to play a part of the hidden curriculum. Student treatment and mistreatment, feedback and evaluation are also part of the culture of the hidden curriculum (Hafferty & O’Donnell, 2014)

Dutton and Sellheim (2014) wrote about the hidden and informal curriculum found in physical therapy programs. Prior to their work, this dialog had never been reported in physical therapy education. This qualitative study attempted to qualify and answer if PT students believe there is indeed an informal and hidden curriculum within the formal didactic and clinical education curricula. Their results indicated that physical therapy students at the three programs surveyed do indeed recognize the presence of hidden and informal curricula. They found that student learning is certainly impacted by the presence of this curriculum. Most of their work centered on finding themes of influence on the core values of compassion/caring, excellence, integrity and professional duty. They looked for internal and hidden curricular influences related to these core
There may be hidden curricula influences, that have not been studied or reported on, that promote successful passing of the NPTE (Dutton & Sellheim, 2014).

Some of the characteristics of the hidden curriculum at UNM involve the dedication to service and professionalism development. The UNM program exemplifies professionalism by supporting the professional organization, the American Physical Therapy Association (APTA), and requiring the students to join while attending the program. The Induction ceremony, which occurs within a month of starting the program, is a ceremony welcoming the new students to the profession of physical therapy and into the APTA. The program gives time off from school to attend the annual combined sections conference of the APTA. There are inter-professional education opportunities, service learning and a student-run, pro bono physical therapy clinic to give physical therapy to those in need. The program divides the student body into advisor teams where students are assigned a faculty advisor that follows them throughout the program. These faculty meet with their advisees at least two times formally during their time in the program, and many more times informally. Student issues and difficulties with progress in the curriculum are discussed at biweekly faculty meetings. Faculty seek to intervene early, and often, with students who might be struggling both in the curriculum and in incorporating school into their own lives. The program provides assistance through tutoring, peer mentoring, and senior mentoring programs. All of these are thought to contribute to the hidden curriculum within the program.

**Standardized Testing**

Social injustice related to race and socioeconomic status (SES) and standardized testing are areas of in-depth study across the United States (Alexander, 2016; Bass &
Faircloth, 2013; Educational Testing Service, 2012; Fair Tests National Center for Fair & Open Testing, n.d.; Freire, 2000; Provenzo, 2006). As reported in the CAPTE report in 2015-2016, there were 31,426 students enrolled in PT programs (Artis, 2016a). Within this data, 77.5% (24,355) were Caucasian, 3% (943) were African American, 4.4% (1,383) were Hispanic/Latino and all other races/ethnicities comprised 15% (4,745).

The difficulty of passing standardized tests related to race and socioeconomic status (SES) is multifaceted. Difficulties abound in attracting significant numbers of minority applicants to healthcare education (HE) (Cook, 2015). In order to qualify for admissions to an HE track, the student must positively navigate the education system through elementary and secondary schools as well as obtain a university degree and score high enough on entrance examinations like the MCAT or GRE. The barriers to even make it to college, let alone graduate and be successful, continue to this day (Cook, 2015). Disparities start with lower expectations for children of color over their white counterparts beginning at home with expectation differences noted as early as the age of two (Cook, 2015). Figure 3 outlines the discrepancies found in early education at home with Black families performing at a lower level for activities that lead to literacy.

![Home Literary Activities With Family Members](image.png)

*Figure 3. Home literary activities with family members (Cook, 2015).*
Black students were three times more likely to be retained in K-12 grade levels and less likely to graduate from high school (Cook, 2015). Testing discrepancies begin as early as kindergarten and persist with the SAT, where “Black students had a mean score of 428 for both critical reading and math, compared with mean scores for white students of 527 for critical reading and 536 for math” (Cook, 2015, para. 10). “Schools serving more minority populations have less-experienced, lower-paid teachers who are less likely to be certified” and there are less rigorous classes offered at schools that are primarily populated with minority students (Cook, 2015, para. 15). If a minority student has all these possible barriers coming into a PT curriculum, they may be a source of difficulty with passing the standardized NPTE.

**Benchmarks in Medical Education**

**History of benchmark testing.** Assessment through the use of benchmark and high stakes examinations has not always been a part of medical or physical therapy education. Early in the last century, in order to set standards and assure quality of education, the American Medical Association introduced the licensure examination in order to have students enter into practice (AMA, 2016). Prior to the licensure examination, candidates merely studied in an apprentice-type manner and then were allowed to practice as physicians.

Medical training, as recently as the 18th century was an apprenticeship process for young men. The family doctor took a young apprentice under their tutelage through an indentured process, teaching the young boy methods of bleeding, leaching, and mixing of pharmaceuticals. The apprentice learned the art of medicine, which was minimally
scientific at that time, at the side of a master physician. There was no formal education required (Flexner, 1910).

In the United States (US) during the 1700’s, all those aspiring to become physicians traveled to Europe for training (Penn Medicine, 2015). In the 1700’s, these apprentice-trained physicians returned to the United States and began practicing their trade in the New World. Class and privilege would allow a family to afford this training.

The first hospital in the US was founded by Dr. Thomas Bond in Philadelphia, Pennsylvania. Dr. Bond had studied in England, where the hospital movement began. Hospitals were created to have a place to house the sick in one area and remove them from the charity rolls (Penn Medicine, 2015). After watching the successful creation of hospitals abroad, Dr. Bond, along with his friend Benjamin Franklin, founded the Pennsylvania Hospital in 1751, beginning formalized medical care in the US (Penn Medicine, 2015).

Records indicate that informal anatomy lessons and training began as early as 1750 (Flexner, 1910). There were no medical schools or places of instruction except at the side of the master physician. In 1762, William Shippen began a lecture series on midwifery and eventually anatomy instruction. In part, these lectures were offered to help those that could not afford to travel a chance to learn medicine (Flexner, 1910).

Shortly thereafter, in 1765, John Morgan, a friend of William Shippen who was also trained in Europe, proposed that the College of Philadelphia create a professorship in the theory and practice of medicine. Morgan became the first Chair of this program and it was he that proposed bedside training at the newly founded Pennsylvania Hospital. “Our first medical school was thus soundly conceived as organically part of an institution of
learning and intimately connected with a large public hospital” (Flexner, 1910, para. 5).

Eventually, after the historical interruption of the Revolutionary War, the College of Philadelphia and University of Pennsylvania merged as one. At its beginnings, this medical school was not trying to “supplant but to supplement the apprenticeship system” (Flexner, 1910, para. 5).

There was much disagreement over the years about the direction and organization of medical education. It certainly moved away from the apprentice aspect during these years but it also did not reach the level of organization and structure that we see in our current medical school curricula. The system was fraught with unethical behavior. People were thought to purchase their degrees (Flexner, 1910). If privilege allowed one to pay for a degree, the degree was granted.

In 1847, the American Medical Association (AMA) was established during what was to be its first meeting at The Academy of Natural Sciences of Philadelphia, Pennsylvania. “At the founding meeting the delegates adopted the first code of medical ethics, and established the first nationwide standards for preliminary medical education and the degree of MD” (AMA Resident and Fellow Section, n.d., p. 3). Despite the beginnings of this organization, medicine in the US was still fraught with disorganization, ethical violations and a lack of standardization in both the practice of medicine and the education of its physicians (Flexner, 1910).

The Association of American Medical Colleges (AAMC), founded in June 1876, attempted to rein in and offer organization to the process but they had a difficult time of it as well (AAMC, 2017). It was not until 1904 when the AMA created the Council on Medical Education, which visited the 160 medical schools and categorized them into A-
B-C categories (A=acceptable, B = doubtful, C=unacceptable), that things began to change. In that same year, the AMA published a directory of acceptable schools and outlined medical school admissions requirements (AMA, 2016).

The Flexner report exposed many diploma mills across the US and helped establish new standards to improve teaching in medical schools nationwide. The state medical boards then accepted these standards as regulatory. There was the introduction of regulatory examinations. By 1914 standards were accepted for hospital internship programs and by 1924 standards were written for residency programs (AMA, 2016). With the institution of state board regulations, national examinations were introduced. For many years students needed to only pass one final board examination. About 50 years ago, after more students had difficulty passing the final board examination, the Federation of State Medical Boards (FSMB) and the National Board of Medical Examiners (NBME) under the auspices of the United States Medical Licensing Examination (USMLE), introduced the STEP exams, a chronological series of three examinations given over a period of the course work and clinical work that students had to pass successfully in order to proceed in their training. The USMLE Step 1 is given after the didactic component of education, the Step 2 is given at the end of the clinical component of the education and step 3 is given after the first year of internship (Johnson & Chaudhry, 2012).

Physical therapy programs and a benchmark examination have followed a similar albeit shorter, timeline history as medical school. Physical therapy at first had no standard of examination to work as a physical therapist. Reconstruction aides went through on-the-job training, which provided a certificate of completion beginning in the
1920’s until the early 1950’s (Bach & Wadsworth, 2001; Moffat, 1996). Before 1950, physical therapists registered for an examination in order to obtain a license (Bach & Wadsworth, 2001). By the 1950’s and 60’s, with the introduction of a regulatory body for licensure for physical therapy across the country, a licensure examination for physical therapy was introduced across all 50 states (Bach & Wadsworth, 2001). By the 1970’s the National Physical Therapy Examination, developed by committees of the American Physical Therapy Association (APTA) in conjunction with the Professional Examination Service (PES), was administered on specific days throughout all 50 states (Bach & Wadsworth, 2001). The NPTE has undergone many update changes but there has never been a series of examinations, or step exams, as seen in medicine.

**Test taking abilities related to benchmark testing.** The ability to successfully take benchmark examinations like the NPTE or USMLE is the absolute goal of education that requires an examination to obtain a license to practice. Studies have shown that periodic formative testing can enhance learning over time (Newble & Jaeger, 1983; Roediger & Karpicke, 2006). A testing effect is seen with taking a multiple-choice test and these effects will boost performance on future tests (Marsh, Roediger, Bjork, & Bjork, 2007). “Tests serve as an additional study opportunity, offer retrieval practice and provide retrieval cues in the form of answer options” (Marsh et al., 2007, p. 195). In addition, the use of objective formative progress tests have been shown to improve performance in national licensing examinations like the USMLE (Norman, Neville, Blake, & Mueller, 2010). The quality of the multiple-choice exam is important for learning. Learning is enhanced if the multiple-choice question contains competitive alternatives as selection choices within the question (Little & Bjork, 2015). There are few
studies that are specific to test taking strategies in physical therapy. In physical therapy research, one study demonstrated the correlation of professional GPA to the NPTE score (Kosmahl, 2005). An assumption can be made that if a student has a higher GPA that they may be better at taking examinations, however without further insight into the curriculum that created the GPA, it is difficult to know what type of testing the student had in order to obtain that GPA. It would be incumbent on a program to assure that students are ready to take multiple-choice question examinations through an understanding of test taking strategies related to these types of licensure examination.

**Benchmark testing at UNM.** When the UNM program switched to the DPT and it started to see students struggling to pass the NPTE on the first try, the faculty, after researching the USMLE Step exam process in medicine, opted to introduce a series of benchmark examinations to their students. The thinking at the time was to emulate the NPTE as much as possible so as to help their students learn the strategies for taking the exam as well as re-visiting the curriculum taught a little more frequently than at the end of the three years. In 2014, the faculty opted to create two exams, a Step 1 and a Step 2 that would consist of 200 multiple choice questions covering the didactic curriculum offered the previous two semesters. Step 1 would cover the first two semesters, or first year of the three-year program and Step 2 would cover the 3rd and 4th semesters of the program, or the second-year content of the program. The test would be considered high stakes and the students would have to pass the test with a 70% to continue in the curriculum. The exams were first administered in the spring of 2015. The faculty used NPTE review books to help with question development. The examinations are given on the same day during the final examination period of the spring semester. The students
gather in one large room with each class year taking up alternate rows. The exam is administered as similarly as possible to the NPTE: the examinations are timed and the student is forced off the examination at the time limit, there is no eating or drinking in the exam room except for water, the students are not allowed to have anything extra in the room (bags, purses, phones, and food); there are two proctors at all times. The student immediately receives their results on the examination. If they have not been successful at passing the exam, a retake examination is given. The retake exam is scheduled individually with each student, however most want to retake the exam within the week. In the three-year history of the exams, all students who did not pass the first time, passed on the second attempt. Many students who struggled one year, did not struggle on the Step 2 given after the second year.

At the UNM program, the PEAT exam has always been considered a type of Step exam. The students take this exam at the end of their course work, or year three. The students must pass this examination with a 65% in order to successfully complete the curriculum. In the six-year history of administering the PEAT as a Step 3 exam, only one student has been delayed from graduating due to an inability to pass the exam.

Learning Styles

A recent systemic review looking at different models of learning singled out the Kolb’s Learning Style Model as the most widely accepted learning style model of the 71 learning styles identified (Coffield, Moseley, Hall, & Ecclestone, 2004). The Kolb learning style inventory was first introduced in 1976 with revisions in 1985 and 1999 (Coffield et al., 2004; Kolb, 1984). It was originally developed for college students and adults (Matthews, 1996). The Kolb has been shown to be a stable assessment of
perceived academic achievement regardless of race, gender or grade level (Matthews, 1996).

Despite its popularity and use, the Kolb learning style inventory is not without controversy and questions about its validity (Bergsteiner, Avery, & Neumann, 2010; Manolis et al., 2013; Metallidou & Platsidou, 2008). Critique is centered on the construct validity related to the two-pronged dimensions of learning (Metallidou & Platsidou, 2008). The Kolb inventory looks at the learning experience as either an abstract or concrete grasping of information and that information is either acquired through active experimentation or reflective observation (Bergsteiner et al., 2010; Kolb, 1984; Metallidou & Platsidou, 2008). This inventory identifies four distinct learning styles: Diverging, Assimilating, Converging, and Accommodating (Kolb, 1984). These four learning styles have characteristics that vary along the two dimensions of learning; concrete experience (CE) and abstract conceptualization (AC) and active experimentation (AE) and reflective observation (RO) (see Figure 4).

Adopting an abstract conceptualization and active experimentation mode of pedagogy has been suggested as a way to improve critical thinking in nursing students (Gyeong & Myung, 2008). This study found that students who fell in the Converger quadrant of the Kolb had higher levels of critical thinking, a necessary characteristic in physical therapy practice. The order of critical thinking correlation was as follows (in decreasing order): Assimilator, Accommodator and Diverger (Gyeong & Myung, 2008).
At the UNM physical therapy program, the Kolb learning style inventory has been used to help students identify their learning style strengths and potential areas needing attention. The program has been administering this learning style inventory to all entering cohorts for over 10 years. Dissection anatomy groups and other learning groups within the program often try to group students with diverse and alternative learning styles to promote a multimodal approach to learning within these groups. When the learning styles are introduced within the first week of the program, there is a lecture and activity on learning styles that assist students in a better understanding of their learning style to promote communication within groups of learners as well as with their professors. The program has been keeping a record of each student’s learning style as determined at the beginning of the program. In higher education, learning and learning styles are relatively stable (Richardson, 2011). Richardson (2011) cites four longitudinal studies that support stability of students’ conceptions of their learning style from year to year are stable over time, including a citation that reports that there was no significant

*Figure 4. Kolb’s Experimental Learning Model (Manolis et al., 2013, p. 46).*
difference in the reflections on learning inventory (RoLI) from year 1 to year 2 in physical therapy programs. Given this finding, it was of interest to me to determine if there is correlation between learning style and successful first time passing of the NPTE at the UNM DPT program. It was also of interest to determine if there is any correlation to the nursing study that found more of their critical thinkers were in the converging category (Gyeong & Myung, 2008).

**Personality Factors**

**Emotional Intelligence.** Emotional Intelligence (EI) is a psychological term that first appeared in a 1964 book by Davitz and Beldoch. Emotional intelligence has been defined by Solovey and Mayer as “the ability to monitor one’s own and others’ emotions, to discriminate among them, and to use the information to guide one’s thinking and actions” (1990, p. 189). There has been much debate about EI with multiple sources presenting models or hypotheses related to EI beginning with the original work in 1964, as well as a book published on the topic by Goleman (1995). Many of the initial claims related to EI have had questionable construct validity (Van Rooy & Viswesvaran, 2004). Generally, scholars agree that it has been difficult to measure EI (McCrae & Costa, 1987; McCrae & John, 1992).

A meta-analysis investigation (Van Rooy & Viswesvaran, 2004) found that EI and personality appear to be correlated with the personality traits called the Big Five factors. These five factors were found to have “correlations to EI in excess of .31” suggesting that the “distinctiveness of EI and personality may not be as clear-cut as it needs to be” (Van Rooy & Viswesvaran, 2004, p. 86). This study, as well as additional studies looking at the relationship between personality dimensions and emotional...
intelligence, suggested that there is construct validity between EI and the Big Five factors of personality (Ghiabi & Besharat, 2011; McCrae & Costa, 1987; Van Rooy & Viswesvaran, 2004). These connections became a springboard to multiple studies looking at connections between EI and the Big Five factors.

The Big Five Factor Model (also called the Five Factor Model or FFM) of personality, has likewise undergone multiple models and hypotheses (McCrae & John, 1992). The hypothesis is that the dimensions of personality can be described with five factors: extraversion, agreeableness, conscientiousness, neuroticism and openness (McCrae & Costa, 1987; McCrae & John, 1992). These Big Five personality traits have undergone validity testing for predicting academic criteria such as GPA and college performance (Conard, 2006). Results from this study showed that conscientiousness predicted three academic outcomes, GPA, course performance and attendance (Conard, 2006). Other studies have found that the Big Five personality traits can predict college students’ academic motivation and achievement (Komarraju, Karau, & Schmeck, 2009), and overall student success (Chapin, 2015; Grehan et al., 2011; O’Connor & Sampo, 2007).

The Big Five factors may represent a way to quantify the differences we see in students’ success. Numerous studies make use of the NEO Personality Inventory Revised (NEO PI-R) to assess personality traits. The NEO PI-R is a 240-item questionnaire that assesses the Big Five factors of extraversion, agreeableness, conscientiousness, neuroticism and openness to experience (Costa & McCrae, 2007). The conscientious individual is “organized, hard-working, and achievement-oriented, is more likely to be motivated to perform well and will display higher academic performance than the person
who is not” (Grehan et al., 2011, p. 318). Openness to experience “includes characteristics such as receptiveness to new ideas, preference for varied sensations, attentiveness to inner feelings and intellectual curiosity” (Grehan et al., 2011, p. 319). Higher levels of neuroticism may explain some of our students’ high levels of anxiety when taking standardized tests that might lead to poor performance on the NPTE. The differences in EI and the Big Five factors could be the elusive factors that help us better understand success, or lack of success, in the UNM PT students.

**Grit.** Many studies that look at predictors of academic success in higher education find that only 25% of the variation of success is explained by high school grades and standardized tests (Akos & Kretchmar, 2017). Studies that look for predictors of success for passing the NPTE have similar findings (Riddle et al., 2009; Utzman et al., 2007). Recently, Duckworth and co-authors introduced a non-cognitive personality trait related to perseverance and passion for long term goals called grit (Duckworth et al., 2007). Duckworth et al. (2007) suggest that grit relates to the Big Five personality traits and it was found to have predictive validity of success related to educational attainment in two samples of adults, grade point average in a sample of Ivy League undergraduates and retention in West Point cadets, as well as in a sample of adolescents related to their ranking in the National Spelling Bee.

In the ten years since this concept was first introduced, many have looked at grit to attempt to explain variance of success seen in the workplace, military, school and even marriage (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014; Hammond, 2017; Palisoc et al., 2017). There has been literature that challenges this fascination with grit. A case study in urban education looked at the social inequities framework and found that
success cannot be explained by grit alone (Golden, 2017). Another study found no relation between grit and the ability of doctoral students to complete a dissertation (Cross, 2014) and other studies did not find predictive validity of grit and academic outcomes (Bazelais, Lemay, & Doleck, 2016; Ivcevic & Brackett, 2014; Muenks, Wigfield, Yang, & O’Neal, 2017).

Grit can be measured using an eight-item instrument (Duckworth & Quinn, 2009). The short grit scale (Grit-S) has an internal consistency of .73 to .79 and a correlation of $r = .68$, $p < .001$ when testing one year later (Duckworth & Quinn, 2009). To attain a physical therapy doctorate requires stamina and goal orientation; to first complete an undergraduate degree and then successful attain admissions and graduate from a physical therapy program. This long term, goal-oriented process and stamina appears to correspond to the statement that a “gritty individual pursues a given goal over years” (Akos & Kretchmar, 2017, p. 165). There are no known studies related to grit and successful physical therapy graduates and there are no studies looking at grit and successful passing of the NPTE on the first try. It was of interest to me to see if there was any correlation to the passing of the NPTE on the first try and a graduate’s grit score.

**Mindset.** Implicit theory research concerning the assumption “that personal beliefs are critical for (the) understanding of human behavior” date back to 1928 with the work of Piaget (Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013, p. 657). Building on this theory that beliefs, self-regulation and personality influence outcomes, Dweck (2008) was the first to publish on the idea of the fixed and growth mindset of individuals. Her pivotal work in the psychology of how people cope with failure began through research looking at how children grapple with hard problems or puzzles. She found that
some children relished the challenge and the aspect of failing and trying again and others were stopped in their tracks when stumped. From this beginning behavioral research, her theory of two personality traits, or mindsets, emerged (Dweck, 2008).

The fixed mindset view is that intelligence is limited, your personality and your moral character are fixed (Dweck, 2008). People with fixed mindsets have a “consuming goal of proving themselves – in the classroom, in their careers, and in their relationships” (Dweck, 2008, p. 6). People with a fixed mindset look for confirmation of their intelligence and character in every challenging event in their life. These people see failure as fatal, tend to not reach out to others for help, avoid challenges, dislike effort and give up more easily when facing set-backs (Dweck, 2008; Rattan et al., 2015). People with a fixed mindset tend to be extremely sensitive about being wrong or making mistakes. People with fixed mindsets may think that others are judging them, especially the professor, when looking at failure or challenges in the classroom (Dweck, 2008).

In contrast, the growth mindset person loves challenges, believes that their own effort will change the outcome, are resilient in the face of set-backs and seek help when needed (Dweck, 2008) such that “growth mindsets foster greater learning and achievement in students from elementary to college” (Rattan et al., 2015, p. 722). People with a growth mindset tend to seek out challenges and bounce back from failure. They tend to reflect on the failure and look for ways to solve the issue so that they can try again. People with growth mindset see the professor as a resource for learning and are open to the growth and uncomfortable feelings that occur with being a novice in a learning situation (Dweck, 2008).
When an academic environment communicates a growth mindset to its students, students are more successful (Rattan et al., 2015). Growth mind-set interventions have been shown to raise college-students’ semester grade point average, all the while teaching that struggling is an opportunity for growth, not a failure in intelligence (Paunesku, Walton, Romero, Smith, Yeager, & Dweck, 2015). Students can be taught how to achieve a growth mindset with simple online training that includes information about the brain and learning (Paunesku et al., 2015). Part of this presentation is structured to teach students that intellectual abilities can be developed with “hard work, better learning strategies and help from others” (Rattan et al., 2015, p. 722).

Another mindset challenge is the psychological factor related to the feeling of belonging. Social belonging is considered a “fundamental human need” and its effects on intelligence quotient (IQ) testing has been documented (Walton & Cohen, 2011, p. 1447). Increasing a student’s sense of belonging to the academic institution can cut the racial gap among college students in half (Walton & Cohen, 2011) and can also eliminate the social class achievement gap (Stephens, Hamedani, & Destin, 2014) because “students are more likely to feel that they belong when academic environments communicate growth mindsets” (Rattan et al., 2015, p. 722).

Summary

This study underlines the important admissions criteria and the curriculum, as well as student characteristics that may lead to successful first time passage of the NPTE in the UNM physical therapy curriculum. Through study of the quantitative measures that are accessible, such as admissions criteria and cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as well as qualitative aspects of students
who are both successful and not successful in their first attempt at the NPTE, I explored the potential predictors of success that may frame admissions policies as well as looked for themes related to the policies of the program, to reach the ultimate goal of having a graduate pass the NPTE on the first attempt. I looked for themes or correlations related to the hidden curriculum, learning style, and grit to help explain any variance seen in the quantitative scores.
Chapter 3

Research Design

Purpose and Research Questions

This study underlined the important criteria of admissions and the curriculum, as well as student characteristics that may have led to successful first time passage of the NPTE in the UNM physical therapy curriculum. Through study of the quantitative measures that were accessible, such as admissions criteria and cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as well as qualitative aspects of students who were both successful and not successful in their first attempt at the NPTE, I explored the potential predictors of success that may frame admissions policies as well as looked for themes related to the policies of the program, to reach the ultimate goal of having a graduate pass the NPTE on the first attempt.

Given this information, my research questions were:

1. What are the relationships between NPTE scores/first time passing and the UNM admission criteria, age, gender, race/ethnicity, STEP scores, and PEAT score?
2. What are the potential areas of the curriculum that may be contributing to NPTE scores or students either passing or not passing the NPTE on first try?
3. Are there components of personality, emotional intelligence, grit or learning styles that may be contributing to the NPTE score and students either passing or not passing the NPTE on the first try?
Mode of inquiry

This study was a programmatic evaluation intrinsic case study design bounded with one physical therapy program over a six-year span (Creswell, 2013). A case study “investigates a contemporary phenomenon (the “case”) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident” (Yin, 2014, p. 16).

A case study inquiry has multiple data points and sources of evidence and “benefits from the prior development of theoretical propositions to guide data collection and analysis” (Yin, 2014, p. 17). The UNM physical therapy program was the case of interest. There were multiple data points that I believed to be a part of student success on the NPTE, some were known, such as admissions scores and data points, and some were unknown phenomena that needed exploration, such as the learning style or grit. Using case study for programmatic evaluation is not without controversy (Yin, 2014). According to the standards of the American Evaluation Association, case study evaluations are ranked fifth out of eight best approaches for designing and conducting evaluations (Stufflebeam & Shinkfield, 2007). Given the complexity of the research questions for this proposal, this approach gave me the best view of a very fluid educational program.

Using case study design allowed an “in-depth (and close-up) examination of the program within its real-world context”(Yin, 2014, p. 220). This captured the complexity of the case within the context of the changes to the curriculum over time as well as allowed me to look for interactions or extraneous variables contributing to the graduate’s success.
The bounding of the case over this six-year time span is significant because it included the first six years (cohorts) of the DPT curriculum at UNM. In addition, during this period, three of the class cohorts experienced the curriculum without the STEP exams and three of the cohorts experienced the curriculum with either one or both STEP exams. All six cohorts participated in the PEAT before taking the NPTE. This case study evaluation approach allowed a focus on the initiation of the STEP exams, studying the examination of the implementation of the STEP exams in the course of this bounded period with comparisons in cohorts that did or did not have the exams (Yin, 2014, p. 222). It also allowed a focus on outcomes, the passing of the NPTE. By using a case study, I was able to explain the possible links between the initiative and the outcome (Yin, 2014, pp. 224–225).

A mixed methods approach is often termed a “third paradigm” for social research (Denscombe, 2008) and falls under the pragmatism research paradigm (Feilzer, 2010). Using a pragmatism paradigm approach allowed a careful look at the problem (not passing the NPTE) while looking for underlying themes, and data, that might point to solutions in this ever changing and unpredictable situation of student success in a dynamic curriculum. With a pragmatism paradigm, a mixed methods approach offered the best design (Denscombe, 2008; Feilzer, 2010; Johnson & Onwuegbuzie, 2004). Using this approach, research includes any or all of the following: sampling, data mining, measurement and scaling, usability testing, statistical analysis, questionnaire, focus groups, interview, observation and theme identification, to name a few possible techniques (Patel, 2015). The use of “multiple sources of evidence in case study research allows a researcher to address a broader range of historical and behavioral issues” (Yin,
As with many case studies, it was important that there was triangulation of all the multisource data, both the qualitative and quantitative, before reaching any conclusions. I used a cross-case synthesis design looking at samples from each of the six cohorts (Yin, 2014, p. 221). As seen in my conceptual framework figure presented earlier, I used a convergence of multiple sources of evidence to help with this triangulation (Yin, 2014, p. 121).

As a member of the faculty in the case, conducting the study meant that I needed to be aware that I was “the agent on whom the action depends” and I “have a history” within the case (Ricœur & Blamey, 2008, p. 113). As with some phenomenology studies, where it is impossible to take the researcher completely out of the study, thus it was important to bracket my own exposure to the program and focus on the cohorts of the program without bringing myself into this analysis and evaluation of the program (Creswell, 2013, p. 78). I was sure to disclose this to the graduates before conducting the interview. I made sure to tell all participants that they were to try to think of me as a researcher and not their professor and that I welcomed any and all answers to the questions. I treated all involved in the study with respect, heeded their opinions, and valued their knowledge (Weiss, 1998, p. 112). I also assured them of the confidentiality of the interviews and data to assure they felt they could speak freely without any fear of retribution for their answers.

**Institutional Review Board**

This study was submitted to the institutional review board (IRB) of the University of New Mexico in December 2017. The study was approved by the IRB (#24417) February 15, 2018 (see Appendix B for approval letter). Included within the IRB were a
consent for the qualitative/quantitative group and a consent for the quantitative only group. I obtained consent for all participants who completed the interview and surveys (n = 106). The IRB approval included a waiver of consent to make use of programmatic data accumulated within the program for the remaining graduates (n = 61). The waiver of consent limited the use this data taking care to reduce the racial and ethnic groups to a total of three (Caucasian, Hispanic and Other) to assure confidentiality of the data.

Sample and Groups

The sample consisted of all six cohorts of the DPT (n=167) from 2012-2017. To create the interview group for the qualitative portion of the case study, I kept the sample in their original graduation year cohort. To decrease sampling bias, I stratified the sample to assure I had graduates from differing levels of success (or lack thereof) of passing the NPTE (Vogt, 2007).

I created a stratified random sample of each cohort (see Figure 5). The stratification was created based on the mean National NPTE score ± 1 standard deviation of the NPTE for that particular cohort year. I created three strata in each cohort year. From each UNM cohort (n=6), I randomly selected one student from each of the three following strata for a total of 18 (3 criteria x 6 cohorts):

1) Those who were within 1 standard deviation below the national mean,

2) Those that scored one standard deviation above and below the national mean,

3) Those that scored above one standard deviation from the National mean.
Once accumulating the National mean score and standard deviation for the year in which they took the NPTE (FSBPT, 2017), I then sorted the cohort by their NPTE score and placed the appropriate graduates into the strata (Figure 5). Once I had the number of students in each stratum confirmed, I used a random generator to assign those students a number consistent with the sample of that strata. The number “1” in each strata became the graduate I first contacted for the interview portion of the qualitative portion of this study. I was able to interview 17/18 number “1” selections for interviewing. For the 18th interview, the first selection declined to be interviewed so I went to the second selection based on the random generator. This entire interview group also completed the Kolb inventory and Grit survey (see Appendices C and D).

Within the random sample this stratified sampling technique created, I successfully captured a few graduates who did not pass the NPTE on the first attempt. Within the entire sample of 167 graduates there were 9% that did not pass the NPTE on
their first attempt. Of interest, in my stratified sampling I came as close to that as possible, having 11% of my stratified interview sample consist of those who did not pass the NPTE on their first attempt. I also successfully mirrored the gender split of my larger group. The large sample of all 167 graduates was 70% female. My stratified random sample ended up being 66.6% with 12 females and 6 males.

The remaining graduates (149) became a part of the quantitative only group. Using a programmatic database, social media, and personal contact I invited the remaining 149 graduates to participate in my study. I converted the consent form and the Grit-s and Kolb surveys found in Appendices C and D to PDF fillable forms and then sent these via email to all the graduates. The participants then proceeded to complete the surveys, electronically sign the consent form and return the surveys to me via email. The surveys and consent were then printed, coded and recorded in the study database.

Collection of these surveys occurred from February 25, 2018 to April 7, 2018. Beyond the 18 people who completed the surveys when they were interviewed, there were an additional 90 surveys returned with only one survey not being a complete packet (missing the Grit-s survey). This gave an overall 64.67% (108/167) return rate for the study.

**Qualitative Data Collection**

I conducted 13 interviews via FaceTime/Google Hangout, one by telephone, and four in person. I audio recorded the interviews and then created verbatim transcriptions (Seidman, 2013). I organized the 18 interviews into the subject items of the questions (Saldaña, 2016). I sent the transcripts back to the participants for verification of the transcribed information (Creswell, 2013). I grouped emergent themes and coded them with key words and phrases (Creswell, 2013). I created a summary of the general
findings and sent it to the participants asking for any additional comments they might have. All interview participants were given a $100 incentive to participate in the research study. The incentive was funded from the grant.

**Interview questions.** The questions for the interview included:

1. Did you pass the NPTE on the first attempt?
2. What do you feel contributed to the score you received on your first attempt at the NPTE?
3. What occurred during your time at UNM that you feel assisted in being successful on the NPTE?
4. What relationship do you see between the curriculum and your score on the NPTE?
5. Were there cultural aspects of the program that helped or hindered you to achieve the score you did?
6. What do you feel were your weaknesses when taking the NPTE? Why do you think these were weaknesses? How do you know they were weaknesses?
7. What could the school have provided to help with those weaknesses? How might that help affected your first attempt at the NPTE?
8. Was there anything else you can think of that might have affected the score you received on the first attempt at the NPTE?
9. Did you take the STEP or PEAT exam while in the program?
10. What was the impact of taking the STEP or PEAT exam on your first attempt at the NPTE?
11. Is there any other information you would like to share?

Additional probing questions that occurred in many of the interviews related to group study practices of the graduates. With question number 5, I had to define “culture” to many students and used the definition of “hidden curriculum” located within Chapter 1 of this manuscript. When it became apparent that a graduate had a stumbling block in success (either with the NPTE, STEP or PEAT exams), I often asked them further questions about their reaction to the struggle and how they dealt with it.

**Quantitative Data Collection**

I used an aggregate sample of admissions criteria and NPTE exam scores from the DPT classes of 2012-2017 (n = 167). Students who did not complete the program during that time, due to academic difficulties (4), death (1) or electing to withdraw (1), were excluded from this database (n = 6). One student from the class of 2015 did not take the NPTE and that student will be considered a person who did not pass the NPTE. There were 4 students that ultimately passed the NPTE that did not release their NPTE results. To allow inclusion of their data, I replaced the missing NPTE score with the mean National score of the NPTE for all that passed on the first attempt (n = 3). There was one student who did not pass on the first attempt who did not release their score to the program; for this student, as well as the person who never took the NPTE, I used the program’s mean score (572) of all graduates (n = 14) who did not pass the NPTE on the first attempt. There was a subset of students (class of 2012) that were missing the PEAT scores (n = 25).

The classes of 2012-2014 did not have to take the STEP exams (n = 81). The class of 2015 took the STEP 2 exam (n = 28), while the classes of 2016 and 2017 (n = 58) took
both STEP exams. I divided the cohorts into group A, those that did not have the STEP exams (n = 81) and group B, those that had some form of the STEP exams (n = 86) for data analysis and comparison.

I created the database from internal records (at UNM) and records from the Physical Therapy Centralized Application Service (PTCAS). For the class of 2012, UNM was using an internal admissions process, not PTCAS, and information was taken from their written applications to the program. To standardize all GRE scores, I used the concordance tables located in Appendices E and F to convert all scores to a percentile (Educational Testing Service, 2012). For GRE scores prior to April 30, 2012, I made the conversions using the concordances tables found in Appendix E. Those with GREs taken from May 1, 2012 through June 30, 2014 were converted using Table 1a found in Appendix F.

I entered all survey results into the database. I then coded the database and created a codebook (see Appendix G). I de-identified the data and I imported the data into SPSS. After importing the data into SPSS, I calculated additional variables: 1) the age (AGE) of the graduate by taking the year that they graduated and subtracting the year of their birth and 2) a TIMELAG variable by subtracting the year of their first undergraduate degree from the year they received their DPT.

The dependent variable was the score on the National Physical Therapy Exam (NPTE). This was the score that all students earned on their first attempt taking the examination. This dependent variable was also recoded as a categorical variable; coding the variable as pass on first attempt/no pass on first attempt (PASS1). The independent variables were: percentile for quantitative GRE (qGRE), percentile for verbal GRE
(vGRE), cumulative GPA (cGPA), undergraduate GPA (uGPA), prerequisite GPA (pGPA), programmatic GPA (pGPA) race/ethnicity of the student broken into 3 categories (ETHNICITY), gender of the student (GENDER), class year (coded in two ways), the age of the student at the time of awarding the DPT(AGE), the amount of years between the awarding of the undergraduate degree to the DPT degree (TIMELAG), college they attended for undergrad (COLLEGE), the practice examination taken in their third year (PEAT), the STEP 2 exam (STEP2) and the STEP 1 exam (STEP1), the Kolb learning style (LEARN) from within the program,, the Kolb learning style given for this study (LEARN2). The difference in their Kolb learning (DLEARN coded as 1 if there was a change in their learning style) and the Grit score (GRIT). All of these variables and detailed coding can be found in the codebook in Appendix G.

I used SPSS to analyze all quantitative data. I calculated descriptive statistics for all variables for all six cohorts, the between difference of Group A and Group B as well as within cohort differences of the cohorts for: gender, race, age, time from undergraduate completion, STEP 1 and 2 exams, PEAT exam scores, GPA (cumulative prior to the program, programmatic GPA, undergraduate GPA and pre-requisite), NPTE scores, NPTE first time passing rates, Kolb styles and Grit. I examined if the Kolb learning style changed and looked at the numbers of students who were in each category (Accommodating, Diverging, Converging and Assimilating).

I then looked at related variables. I created scatterplots of all continuous variables in relationship to my dependent variable, the NPTE. I looked for linear relationships and estimated a simple correlation matrix of these continuous variables for both group A and
B as well as the sample as a whole. I estimated non-parametric correlations using the categorical data.

To summarize the data collection process and organize a time line for the process, I created a flow chart of the steps I took throughout my data collection. This can be seen in Figure 6.

**Data Collection and Analysis Timeline**

*Methodological Timeline*

- Create database:
  - Scores - NPTE, PEAT, STEP
  - Admissions criteria: GPA, GRE
  - Demographics: ethnicity/race, gender, residency status, college attended, year of birth, year of graduation, learning style inventory
  - Code graduates with number

- Set up data collection days for interviewing and testing time
- Create sample for interview/test group. All remaining enter the test group.
- Invite to study via email with explanation and consent
- Schedule participants
- Interview/Test Group
  - Interview
  - Test: Kolb and Grit
  - Score tests; match with database and insert information
  - De-identify graduates
  - Move data into SPSS
  - Create variables and codebook
  - Begin qualitative analysis
- Test Group
  - Test: Kolb and Grit
  - Score tests; match with database and insert information
  - De-identify graduates
  - Move data into SPSS
  - Create variables and codebook
  - Begin quantitative analysis

*Figure 6.* Methodological timeframe of study looking at the characteristics associated with first time passing of the NPTE in the UNM DPT cohorts of 2012-2017.

**Standards of Quality**

To assure the quality of my work, I interviewed all 18 candidates and transcribed the interviews before analysis began (Seidman, 2013). I recorded the interviews to assure accurate transcripts. After transcribing the interviews, I emailed the transcript back to the participant and ask for a return email (within 1 week) accepting and verifying the
transcript as what occurred during the interview. The participant could clarify words or spelling but not change the content of the interview answers.

Once the interviews were completed, I then began the analysis and coding to “try to minimize imposing on the generative process of the interviews what I think I have learned from other participants” (Seidman, 2013, p. 116). I conducted qualitative analysis using a coding method described by Saldaña (2016). Using a Microsoft Excel worksheet, I outlined categories for each interview. Overall themes from all interviews emerged and I analyzed the implications of these themes for the research questions at hand.

To assure validity of the themes and codes, I created a summary of my findings and sent it back to the participants for further comments as a “member check in” (Saldaña, 2016, p. 37). I then incorporated all additional comments from participants into the final qualitative findings.

To control for database entry errors, I employed an assistant to verify my entries and report on any errors.

Summary

This study was a mixed methods case study of the University of New Mexico DPT Program looking at six cohorts from 2012-2017. The purpose was to define characteristics of students who have successfully passed the NPTE on the first try. I looked at admissions criteria, in-program criteria (benchmarks), demographics of the candidates, learning style, and grit. I also looked for qualitative themes to address potential hidden and informal curricula contributions as well as personality factors related to mindset.
Chapter 4

Analysis

Overview

This study was a mixed methods case study of the University of New Mexico DPT Program looking at six academic cohorts from 2012-2017. This study made use of cumulative data collected during the UNM DPT graduate’s time prior to admissions, at admissions, benchmark exams, and learning style recorded during the program, as well as data collected solely for the purpose of this study (revisited Kolb learning style and Grit-S). The purpose was to define characteristics of students who have successfully passed the NPTE on the first try. I looked at admissions criteria, in-program criteria (benchmarks), demographics of the candidates and grit. I also looked for qualitative themes to address potential hidden and informal curricula contributions, as well as, learning style and personality factors related to mindset. This chapter is organized into two parts. The first part looks at the descriptive statistics and demographics of the sample. The second part concerns the analysis related to each of the research questions. Within the second part there are three sections, one section for each research question.

The research questions are as follows:

1. What are the relationships between NPTE scores/first time passing and the UNM admission criteria, age, gender, race/ethnicity, STEP scores, and PEAT score?

2. What are the potential areas of the curriculum that may be contributing to NPTE scores or students either passing or not passing the NPTE on first try?
3. Are there components of personality, emotional intelligence, grit or learning styles that may be contributing to the NPTE score and students either passing or not passing the NPTE on the first try?

To answer the first research question, I used quantitative information located within my database. I utilized the qualitative portion of the study consisting of eighteen interviews to answer the second question. To answer the third research question, I utilized the quantitative information received via the surveys as well as any qualitative information gathered concerning learning style, mindset, and grit during the interview portion of the study.

**Descriptive Statistics for the Sample**

**Demographics.** The sample consisted of six cohorts of graduates of the UNM DPT program from 2012-2017 (n = 167). The sample was predominantly female with 70.7% female (n = 118) and 29.3% male (n = 49). Ethnicity was split heavily towards Caucasian (68.9%, n = 115) with the rest divided between Hispanic (25.1%, n = 42) and other (Asian, African American, Native American, Pacific Islander) (6%, n = 10). The sample was principally New Mexico residents, 89.2% (n = 149) with the remaining 10.8% (n = 18) coming from multiple places across the United States.

The average age of the graduates at the time of graduation was 30.46 (std. = 5.602) with a range of 24 to 52 years. The mean years from undergraduate degree to entering the DPT program (TIMELAG) was 6.49 years. This TIMELAG variable demonstrated that the majority of graduates were traditional students with 31.1% (n = 52) attending graduate school directly from their undergraduate education. Another 29.9% (n = 50) of students attended graduate school within 2 years of completing their
undergraduate degree. A substantial group, 24.55%, (n = 41) returned to graduate school between three to seven years after their undergraduate experience. The remaining group of students (14.4%, n = 24) had a range of eight to twenty-seven years from their undergraduate degree, with a median of twelve years and a mode of 8 years.

The majority of the graduates, 71.3% (n = 119) attended undergraduate programs in the State of New Mexico while 28.7% (n = 48) attended undergraduate programs out of state (Figure 7). There are six New Mexico undergraduate programs represented by our graduates: University of New Mexico 59.9% (n = 100), New Mexico State University 6% (n = 10), New Mexico Highlands University 1.8% (n = 3), Western New Mexico University 1.8% (n = 3), Eastern New Mexico University 1.2% (n = 2) and The College of Santa Fe 0.6% (n = 1). Within the 48 graduates who attended undergraduate college out of state, 70.8% (n = 34) were New Mexico residents.
For analysis, I divided the six-cohort sample into two groups: those that did not have the STEP exams (Group A, classes of 2012-2014) and those that had one or more of the STEP exams (Group B, classes of 2015-2017). The groups have very similar characteristics related to gender, ethnicity, undergraduate university attended, residency...
status, age and the TIMELAG variable. Demographics of both groups are presented in Table 3.

Table 3


<table>
<thead>
<tr>
<th></th>
<th>Group A (n=80)</th>
<th>Group B (n=87)</th>
<th>Entire sample (n=167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>60</td>
<td>58</td>
<td>118</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>60</td>
<td>55</td>
<td>105</td>
</tr>
<tr>
<td>Hispanic</td>
<td>18</td>
<td>24</td>
<td>42</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Undergrad College</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNM</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Other instate</td>
<td>9</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Out of state</td>
<td>21</td>
<td>27</td>
<td>48</td>
</tr>
<tr>
<td>NM Residency</td>
<td>72</td>
<td>77</td>
<td>149</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>30.46</td>
<td>30.46</td>
<td>30.46</td>
</tr>
<tr>
<td>TIMELAG (mean)</td>
<td>6.48</td>
<td>6.48</td>
<td>6.49</td>
</tr>
</tbody>
</table>

Admissions data. Pre-programmatic admissions data was collected for all 167 graduates. The mean and minimum accepted score for quantitative GRE percentile (GRE Q%ile), verbal GRE percentile (GRE V %ile), undergraduate GPA (uGPA), overall cumulative GPA (cGPA) and prerequisite GPA (sGPA) are reported in Table 4 with a graphic representation in Figure 8. Further analysis of the admissions criteria of Group A and Group B are outlined in Figures 9 and 10. Prior to the class of 2015 the programs admissions rubric did not weigh GRE scores heavily.
After consulting the literature that supported the importance of the GRE as a potential predictor of NPTE score, and recognizing that some graduates were not doing as well as expected on the NPTE, starting with admissions for the class of 2015, the UNM DPT program started to weigh the GRE score more heavily within the admissions rubric (reflected in Figures 8-10) (Riddle et al., 2009). One study found that undergraduate GPA, verbal and quantitative GRE were predictive of difficulty with passing the NPTE (Utzman et al., 2007). According to the literature looking at predicting performance on the licensure exam, the National mean verbal GRE was 49th percentile, ranging from 1st percentile to 99th percentile (Riddle et al., 2009). In the same study, the national mean quantitative result was 35th percentile with a range of 1st percentile to 94th percentile. Initially this requirement was set at the 20th percentile for quantitative GRE and the 30th percentile for verbal GRE (Riddle et al., 2009). A prediction rule score suggests that students with less than a 400, or the 28th percentile on verbal GRE and less than a 530 or the 23rd percentile on the quantitative GRE have a stronger prediction to fail the NPTE on the first try (Utzman et al., 2007). Recognizing the validity of these studies, the UNM DPT program started to weigh the GRE score more heavily in the rubric for admissions. This change in admissions most likely explains the increased GRE scores seen in the classes of 2015-2017 in Table 4 and Figures 8-10.
Table 4

*Cumulative Preadmissions Data for the 2012-2017 Cohorts at the University of New Mexico DPT program (n=167)*

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRE Q%ile</td>
<td>Mean</td>
<td>32.4</td>
<td>33.46</td>
<td>30</td>
<td>46.31</td>
<td>48.63</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>GRE V%ile</td>
<td>Mean</td>
<td>43.84</td>
<td>46.31</td>
<td>49.34</td>
<td>60.79</td>
<td>60.77</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>8</td>
<td>13</td>
<td>8</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>sGPA</td>
<td>Mean</td>
<td>3.57</td>
<td>3.68</td>
<td>3.75</td>
<td>3.78</td>
<td>3.81</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>3</td>
<td>3.32</td>
<td>3.36</td>
<td>3.36</td>
<td>3.45</td>
</tr>
<tr>
<td>uGPA</td>
<td>Mean</td>
<td>3.5</td>
<td>3.58</td>
<td>3.6</td>
<td>3.52</td>
<td>3.48</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>2.4</td>
<td>2.96</td>
<td>3.1</td>
<td>2.65</td>
<td>2.56</td>
</tr>
<tr>
<td>cGPA</td>
<td>Mean</td>
<td>3.51</td>
<td>3.52</td>
<td>3.62</td>
<td>3.55</td>
<td>3.55</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>3</td>
<td>2.99</td>
<td>3.13</td>
<td>2.95</td>
<td>2.77</td>
</tr>
</tbody>
</table>
Figure 8. Graphic visualization of the cumulative admissions scores in the UNM DPT program for the cohorts of 2012-2017, with representation of the change in GRE requirement that occurred for the class of 2015.
Figure 9. Mean and minimum accepted GRE score for the cumulative admissions data for the UNM DPT cohorts of Group A (2012-2014, n=80) and Group B (2015-2017, n=87).

Figure 10. Mean pre-admissions differences for GRE percentile and science GPA for Group A (2012-2014, n=80) and Group B (2015-2017, n=87).
Benchmark exams and professional GPA. Within-program data include the STEP 1, STEP 2 and PEAT scores as well as the professional GPA (pGPA). These are reported in Table 5. For the STEP 1 exam, only two cohorts (2016 and 2017) in this sample had taken the test. For the STEP 2 exam, three cohorts (2015-2017) had taken this test. The PEAT was administered to all 167 graduates; but for one cohort (2012), the test was not purchased by the program at UNM and therefore, no data were recorded or collected for that class, limiting the PEAT score sample to 142. The pGPAs for Group A (mean 3.88 ± .23) and Group B (mean 3.88 ± .22) were almost identical.

Table 5

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP 1 (0-200)</td>
<td>58</td>
<td>112</td>
<td>174</td>
<td>148.52</td>
<td>13.141</td>
</tr>
<tr>
<td>STEP 2 (0-200)</td>
<td>87</td>
<td>121</td>
<td>170</td>
<td>148.48</td>
<td>9.753</td>
</tr>
<tr>
<td>PEAT (0-200)</td>
<td>142</td>
<td>108</td>
<td>184</td>
<td>148.68</td>
<td>16.862</td>
</tr>
<tr>
<td>pGPA (0-4.33)</td>
<td>167</td>
<td>3.19</td>
<td>4.28</td>
<td>3.88</td>
<td>0.224</td>
</tr>
</tbody>
</table>

NPTE scores and pass rate. The NPTE first time pass rate for the entire sample was 91% (n=152), with 9% (n=15) having to retake the exam one or more times. To the best of our knowledge, of the graduates who did not pass on their first attempt, 12/15 (80%) eventually went on to pass the exam and are working as a physical therapist. The programmatic average NPTE score for all cohorts was 681.38 ± 57.120 with a range of 505-800 (Figure 11). Group A (2012-2014) had a NPTE mean of 671.4 ± 58.5 with a
range of 505-800 and had 11 students not pass or not take the NPTE. Group B (2015-2017) had a NPTE mean of $690.55 \pm 54.24$ with a range of 572-800 and only 4 students did not pass or not take the NPTE.

*Figure 11.* UNM DPT first time NPTE scores for cohorts 2012-2017 (mean 681.38 ± 57.12).

The median, percentile and range scores for each cohort is displayed in Figure 12, with the breakdown of the pass rate for each cohort in Table 6. The majority (11/15) who did not pass on their first attempt are in Group A. Of the remaining four graduates that did not pass, 75% were in the class of 2015, which was the first class to take the STEP 2 exam and also the first class with the new GRE admissions criteria. The gender division for those that did not pass on their first attempt ($n = 15$) was 73.3% (11 females, 4 males), slightly higher than the overall sample rate of 70%. The majority that did not pass on their first attempt were Caucasian 80% (12/15), which is a meaningful higher percentage
than the overall sample of 63% Caucasian. The breakdown of the pass rate for each cohort as well as the combined cohorts of Groups A and B is displayed in Table 6.

**Figure 12.** Distribution of the UNM DPT first time NPTE scores based on cohort with the median, maximum, and minimum ranges along with 25th and 75th percentiles. Passing is considered any score >600 (above the blue line).
Table 6

**UNM DPT Cohort NPTE First Time Pass Rate (n=167) Looking at Each Cohort Individually by Year and Combined Cohorts, Group A (cohorts 2012-2014) and Group B (cohorts 2015-2017)**

<table>
<thead>
<tr>
<th>UNM Cohort</th>
<th>Number in cohort</th>
<th>Pass first try (n=152)</th>
<th>% passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>25</td>
<td>21</td>
<td>84.0</td>
</tr>
<tr>
<td>2013</td>
<td>26</td>
<td>21</td>
<td>80.8</td>
</tr>
<tr>
<td>2014</td>
<td>29</td>
<td>27</td>
<td>93.1</td>
</tr>
<tr>
<td>2015</td>
<td>29*</td>
<td>26</td>
<td>89.7</td>
</tr>
<tr>
<td>2016</td>
<td>30</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>2017</td>
<td>28</td>
<td>27</td>
<td>96.4</td>
</tr>
<tr>
<td>Group A</td>
<td>80</td>
<td>69</td>
<td>86.3</td>
</tr>
<tr>
<td>Group B</td>
<td>87</td>
<td>83</td>
<td>95.4</td>
</tr>
</tbody>
</table>

*includes candidate who never took the NPTE*
Relationships between NPTE Scores and Demographic Variables

To answer the first research question about the relationships between NPTE scores/first time passing and the demographic variables, I created scatter plots against the dependent variable, NPTE score, with all continuous variables: QGRE, VGRE, sGPA, uGPA, cGPA, pGPA, PEAT, STEP 1, STEP 2, DPTAGE, and TIMELAG. Initial visual inspection of the scatter plots showed a positive correlation between the NPTE score and these variables: VGRE, QGRE, uGPA, sGPA, cGPA, pGPA, PEAT, STEP 1, and STEP 2. I did not see any relationship between NPTE score and DPTAGE or TIMELAG in the respective scatterplots.

From this list, I estimated a bivariate correlation matrix and found several strong (r > 0.50) correlations and many moderate correlations (r = .30 to .49) (Muijs, 2011). Table 7 presents the estimated Pearson correlations with all strong correlations (r = .50 to 1.0) highlighted in green and all moderate correlations (r = .30 to .49) highlighted in orange. The entire table is in Appendix H.

Within this sample of the UNM DPT cohorts, there is a significant, strong, positive relationship between NPTE score and professional GPA, r = 0.67, p = 0.01 (2-tailed, n = 165). There is a significant, strong, positive relationship between NPTE score and STEP 1 score, r = 0.8, p = 0.01 (2-tailed, n = 56). There is a significant, moderate, positive relationship between the NPTE score and STEP 2 score, r = 0.56, p = 0.01 (2-tailed, n = 85). There is a significant, moderate, positive relationship between NPTE score and PEAT score, r = 0.56, p = 0.01 (2-tailed, n = 140). These positive estimated correlation coefficients tell me that higher scores on the NPTE are associated with higher professional GPAs, STEP 1 and 2 scores, and higher PEAT scores (and vice versa).
There are significant relationships between the undergraduate GPA and cumulative GPA but this would be expected as the undergraduate GPA is contained within the cumulative GPA. There is a significant, strong, positive relationship between the professional GPA and the STEP 1 score $r = 0.71$, $p = 0.01$ (2-tailed, $n = 56$) and the STEP 2 score, $r = 0.64$, $p = 0.01$ (2-tailed, $n = 85$). There is also a significant, moderate, positive relationship between the STEP 1 score and the PEAT score, $r = .52$, $p = 0.01$ (2-tailed, $n = 56$). Of interest, related to the moderate, positive relationships, Quantitative GRE has a relationship to the professional GPA, STEP 1, STEP 2 and PEAT scores, while verbal GRE has only a relationship to the PEAT score. Lastly the professional GPA and STEP 2 scores have a moderate, positive relationship to the PEAT score.
Table 7

*Estimated Pearson Correlation Matrix for Continuous Variables for the UNM DPT Cohorts 2012-2017 (n=167 unless indicated) with Moderate to Strong Correlations Highlighted in Green and Modest Correlations Highlighted in Orange*

<table>
<thead>
<tr>
<th></th>
<th>NPTE</th>
<th>GREQ</th>
<th>GREV</th>
<th>sGPA</th>
<th>uGPA</th>
<th>cGPA</th>
<th>pGPA</th>
<th>Step 1</th>
<th>Step 2</th>
<th>PEAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPTE</td>
<td>1</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>GREV</td>
<td>.242*</td>
<td>.400*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>sGPA</td>
<td>.263**</td>
<td>.346**</td>
<td>.306**</td>
<td>1</td>
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<td></td>
<td></td>
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<td>.711**</td>
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<td>0.104</td>
<td>.200*</td>
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<td>87</td>
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**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
# n=166
To examine the associations between NPTE score and ethnicity and gender, I used the Eta Correlation statistic and the Spearman’s Correlation for categorical variables and found no significant relationship between the NPTE score and gender or ethnicity in this sample. I recoded ethnicity to create two categories, Caucasian and non-Caucasian. I then ran an analysis using pass or not pass on the first try (PASS1) with ethnicity recoded and gender. I did not find any significant associations among any of these variables. It should be noted, however, that the sample was small.

Aspects of Curriculum and NPTE Scores

To answer the second research question about potential areas of curriculum that may have contributed to the NPTE scores, I interviewed 18 graduates, asking about their preparation related to the curriculum and the culture of the curriculum. This led to a discussion of the informal and hidden aspects of the curriculum. Related to curriculum, the following themes emerged: formal curricular preparation, benchmark exams, and the hidden curriculum of the program.

Curricular preparation.

*Formal.* Every single graduate I interviewed stated that they felt the curriculum prepared them for the NPTE. One graduate talked about the trust they had in the curriculum. They expanded to talk about the faculty and how they felt the faculty earned their trust:

Basically, they earned that trust is what really happened. I mean they demonstrated to me, you all did, that you knew the profession; what needed to be known and there weren't any secrets that weren't being told. Basically, the example that was set by you all was what built my trust to know you were all highly qualified to be doing what you’re doing. I put my trust in everyone down
there that I was getting the information I needed to be successful as a PT and to be successful with the exam.

A few graduates from Group A cohort (2012 – 2014) noted three areas within the curriculum that were not as strong as others (Acute Care, Neurology, and Cardiopulmonary). In the exit surveys of graduates that were completed at the end of the program by each graduating class, the program found similar themes. Based on that earlier feedback, these areas of curricular weakness have all been addressed over the course of time. Of interest, I only heard of a weakness in Cardiopulmonary from one of the graduates in the Group B cohorts (2015-2017) and no longer heard about any weaknesses in Acute Care or Neurological content areas. If there were any weaknesses felt, many of the graduates attributed this to their own issues related to motivation related to the subject matter, not the curriculum itself. Some had difficulty with curriculum that was not as interesting to them. Others felt that if they had a weakness, they plugged the hole through the Board Prep class we offered and further independent study. No one felt the program needed to offer something else to help with that weakness.

Several spoke of the NPTE-like questions that many professors incorporated into their classroom formative and summative evaluations, telling me that those helped them stay on track. A few graduates sometimes wished that there were more multiple choice questioning within the formative and summative evaluations of the curriculum as they felt short answer and/or essay type questions did not translate as well to recall on the exam. Another graduate related that the way they took tests within the curriculum, and the rigor of the curriculum, was a preparation for success on the exam, stating:
I mean I definitely had a good concept of the material leading up to it [the NPTE] so it wasn't like I was studying something brand new, it was more refining what I already knew from school. The way that I studied the material before, just for the class, and the way we took the tests [in the curriculum] before we took the boards, I already had the habit of studying so I was already studying like that anyway, so it wasn't a jump going to studying for the boards. I had been doing that the three years leading up to it the whole time so that wasn't different. I already had the material in mind so I just needed to figure out how to use that in the way that you take the test, the way they ask questions.

**Board Prep Class.** About 50% of the graduates I interviewed brought up the value of the Board Prep class that the program offers at the end of the curriculum. Those that did not have the STEP exams mostly talked about the value of this class and the organization that it gave them in preparing for the NPTE. For those that had the STEP exams, there appeared to be less emphasis on the value of Board Prep; however, it was still viewed by this group as having a positive influence in their success.

**Benchmark exams.** When I asked what they felt contributed to their success on the NPTE almost all the graduates attributed a great deal of their success to the “practice exams.” When pressed, these were often the PEAT and the STEP exams that they were talking about.

This thought directly supports the studies that have shown that periodic formative testing can enhance learning over time (Newble & Jaeger, 1983; Roediger & Karpicke, 2006). In addition it supports findings that a testing effect is seen with taking a multiple-choice test and these effects will boost performance on future tests (Marsh et al., 2007).
For the Group A cohorts (2012-2014) who only had the PEAT, on the whole they believed taking the PEAT in the manner in which they did (as a cohort and having to pass to graduate) prepared them for the NPTE exam. After taking the PEAT, many talked about gaining an ability to manage their time better for the NPTE. Others talked about learning to strategize their test taking skills. Some felt it boosted their confidence while others had more anxiety when they did not do well on the PEAT. Overall, everyone in this group felt it helped to get the “jitters” out and mimicked the “real” thing very well. The fact that it was a high stakes exam, that they had to pass the PEAT to graduate, was a way to “kick up” their studying but they did not feel it was detrimental. In fact, many from this group felt having it be a high-stakes test was needed to set the stage for the high stakes of the NPTE. One graduate of this group talked about a key difference in the pressure of the high stakes component between the possibilities of failing the PEAT vs. failing the NPTE. This person knew that if they failed the PEAT they got to retake an additional PEAT in one week’s time, which was a lot better than if they failed the NPTE because that would mean a loss of employment and waiting three months to retake it.

Another graduate in the Group A cohort spoke about the high stakes aspect of the NPTE: “Failing would mean I couldn't work and would have to tell my employer I couldn't work. The financial aspect of it and having to pay for it again” was something they said would not sit very well with them. They went on to say that the PEAT high stakes aspect mimicked the NPTE well and decreased some of the worry about failing and alleviated the fear associated with employment and the finances of taking the exam.

For the Group B cohorts (2015-2017) who had the PEAT as well as either both STEP exams or just STEP 2, 100% (n=9) talked about the benefit of the STEP exams.
One graduate said the following when asked what they feel contributed to the score they received on the first attempt of the NPTE:

I'd say it's a combination of things. Over the course of the curriculum we were prepared with standardized testing at the end of every year [the STEP] but also the final couple months of school we were starting to be introduced to retired questions from the test [Board Prep] and so I think that was the biggest thing that contributed to being prepared was being aware of the format, having been prepared with a lot of those questions previously.

When I asked a graduate if the STEP and PEAT exams gave them confidence in knowing what to expect when taking the NPTE, I received this answer:

Yes and no. I think it's a scary thing to begin with anyway, but knowing what you are walking into decreases fear. It guided our studying patterns too. The Scorebuilders and the other guide [TherapyEd] had the practice exams and I would take those on my own and try to time myself, write down questions I didn't know and take them to my group.

There was a general sense that the PEAT and STEP exams gave them a sense of calm but that nothing reproduces the real thing. One graduate talked about the testing environment at the Pro-metric exam site and how it disrupted their normal momentum of taking a test. They remarked that it was so difficult to take a break since they had to go through physical screening each time they left the room that they did not break as often as they had planned or as often as they had during the STEP and PEAT experience.

When I asked about the high stakes nature of the STEP and PEAT exams, a graduate from the Group B cohort told me:
I think it's important. I think if students are ever given questions or tests that they know don't count for anything then they are not going to prepare for them. The fact that they determine if you continue on, or pass, is important.

One graduate from Group B talked about their experience of failing the STEP exam and how that motivated them to work harder in their preparation for the NPTE. When I asked if there was anything else that might have affected the score they received on the NPTE, this person replied:

I would say one would be a little bit of peer pressure. Not wanting to be the person in your class or in your group that didn't pass on the first attempt or having to tell people that you didn't pass. So actually, I'll circle it back to failing that STEP exam. When I failed that [the STEP exam] it was embarrassing and I didn't want to tell people I didn't pass or be the person who everyone saw as the [person] who didn't pass or had to take it again. So that little bit of motivation, of not wanting to be that person again, definitely impacted how prepared I was trying to be for the NPTE.

**Hidden curriculum.** My interview question that addressed hidden curriculum initially asked the graduates about the culture of the program. Many students needed further explanation of culture, as they tended to discuss culture as it relates to race versus how it relates to the program. Once I elaborated on the term culture and explained it related to anything that was not the intended curriculum, the interviewees quickly began talking about two distinct themes: the professors and staff and the physical attributes of the campus. This directly supports the concept of hidden curriculum as described by
Hafferty and O’Donnell (2014). It further supports Dutton and Sellheim’s (2014) claim that there is a hidden curriculum in physical therapy programs.

**Professors.** There was not one interviewee who did not talk about the support of the faculty. Graduates spoke of the faculty to student ratio and felt it was invaluable in the ability to find help or support at any time. They expressed that the professors had an open-door policy that was welcoming and that faculty were available any day and any time. They commented that they knew that if they had a question or concern that they could find someone in the division to help them. Their success was directly linked to “the open-door policy or willingness of professors to stay after and meet with you at any time and stay after to work with you.”

When I asked what the professors did for them, one graduate said:

Being available to mentor, teach or tutor after hours. That was always something that was made available was communicated well that if you were struggling in a certain area they would meet with you. They would identify what was needed and they'd try to work with you outside of class time as well.

Another spoke of the flexibility of the faculty to meet each person where they were at:

Our professors definitely had a level of professionalism and a level of support that was available so that was certainly part of the culture as well. I guess that is kind of tied into the curriculum, but I felt like our professors and the staff were willing to support students however that looked for each person to make them successful.

Many talked about the advisor program and felt it was helpful. This is summarized by one graduate:
I loved that I was able to have my own PT mentor and that we had regular meetings. I not only felt supported in anything if I had an issue but I also just wanted to make you proud because I knew that you were checking up on my scores and how I was doing. I think that's a really neat piece of the program.

One graduate talked about the quality of the professors as physical therapists:

I just had such a positive experience. The teachers, I still to this day even after going and creating my own practice, I still look back and think of how they were good PT's. I think passionate teachers who are clearly well versed in sound, up to date research is hugely influential and made me want to be a good PT. That was always my goal through the entire program and I think that was fostered by the example of the teachers.

Another talked about the professors’ ability to motivate and direct:

The professors were supportive but also realistic. I've had conversations with professors that straight up told me you need to be better, otherwise you are not going to make it and that can go good for some people and bad for some people that don't like that direct confrontation, but being from a sports background and being used to that type of feedback from coaches, I was able to kind of draw from past experiences on how to handle that feedback. I processed it in a way that's constructive and impactful for moving forward.

This interviewee summarized many of the comments I heard regarding the faculty:

I couldn't speak higher of all the professors. I think that was huge because you guys were just a fun group. You could tell there was connectivity among the
professors and you were really good at connecting with each of the students in the
class as a whole.

*Physical Space.* When asked about the culture of the program and the
University of New Mexico, almost all graduates talked about the physicality of the
campus. There were many conversations about the library, the availability of study
rooms all over campus and the quality of the anatomy lab. Many spoke of the availability
of small rooms with white boards that allowed them to study on campus anytime of the
day, even on weekends. One graduate summarized it as follows:

> It was nice to have the space that we had. There was always a room that we could
go to whether it was practicing manual work, or studying with a partner. With
anatomy, we could always get into lab and see our cadavers and be there and be
present. That’s something I wish I could go back and do again one more time. The
campus itself, it really was for our learning and for allowing us to be successful. I
almost lived there a lot of times.

As a group, most spent more time on campus then at home:

> I do feel as a student I had space and a nice quiet place to learn. I loved studying
here. I could never study at home. I had to study here so I would come here on
Saturday and Sunday and spend my whole day and then I’d go home. I felt like the
building itself and the amount of private rooms we had access to for studying, all
the things we could check out from the library like all of that was just
phenomenal. Things we didn't get in undergrad as much at UNM.

There were some comments about the difference between the first year classroom
space and the second year classroom space and the lack of sunshine in the rooms. Many
were pleased that the first year classroom space was integrated more within the medical school and near the coffee shop however, one graduate spoke of the seclusion:

I felt like we could have potentially have been hindered by the classrooms that we were actually in. We were either in the basement or a room with no windows so I think a lot of time we kind of lost focus because we felt so secluded and boxed in. I think it would have been good to be in a bigger space, a space that was more inviting but also interactive more with the rest of the medical school too. I felt like the PT department was very secluded from other professions that we probably could have gained something from too so that may have been something that hindered it.

All cohorts had classes in two rooms that did not have any natural light. Since they have graduated, the program has moved into a new education building with large open rooms and big windows with expansive views. Many of the graduates, who have seen the new building space, spoke about wishing they had that quality of space when they went through the program.

There was some talk about the lack of knowledge of other professions on campus, such as medicine, occupational therapy, and nursing and many felt the seclusion of our classrooms did not help in making them feel a part of a campus community. One graduate thought this lack of interdisciplinary knowledge was a detriment to his current knowledge as a professional in a medical field:

The only thing I thought potentially hindered me, and I don't know if its 100% related to that, but I didn't feel like there was very much crossing with other students at UNM. I didn't feel like we collaborated with any other graduate
programs other than a few times with the OT program. I feel like the culture wasn't very open to collaboration with their groups but I don't know if that impacted me on the NPTE but I know that it impacted me professionally. I then asked how this impacted them professionally.

I just feel like I even to this day don't have a full understanding of different medical fields, what they do and how I could necessarily contribute to those fields or how they can contribute to my field. I hear that a lot from other graduates too so I don't necessarily think it's just a physical therapy thing but I'm just so baffled by how many other medical professionals don't know what I do and I don't know what they do or how we could help each other.

**Personality Traits, Learning Styles and NPTE Scores**

Research question three asked if there are components of personality (grit, mindset) and learning styles that may have contributed to the NPTE scores. From February to April of 2018, participants completed two surveys at the same time, one to measure learning style and the other to measure grit. The rate of return overall was 64.67% (n=108) for the Grit-s and 65.26% (n=109) for the Kolb. Within the six cohorts and the sub-divided Groups A and B, there was a fairly equal rate of return for the survey (Table 8). Of interest, of the graduates who completed the surveys, only seven out of the fifteen graduates who did not pass the NPTE on the first attempt (46.7%) participated in the surveys.
Table 8

*Rate of Return for the Kolb and Grit-s Surveys for the UNM DPT Cohorts and Within Group A (2012-2014) and Group B (2015-2017)*

<table>
<thead>
<tr>
<th>Cohort</th>
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<th>Kolb (n=109) Rate of return %</th>
<th>Grit-s (n=108) Rate of return %</th>
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<tbody>
<tr>
<td>2012</td>
<td>25</td>
<td>68</td>
<td>64</td>
</tr>
<tr>
<td>2013</td>
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<tr>
<td>Group A</td>
<td>80</td>
<td>68.75</td>
<td>67.5</td>
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<tr>
<td>Group B</td>
<td>87</td>
<td>62.1</td>
<td>62.1</td>
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**Learning style.** Learning style, as described by the Kolb, was fairly evenly split among the four types of learners when examining the learning style results recorded within the first month of starting the program (in-program sample) and skewed towards the right (assimilating and converging) upon repeating the learning style survey post-graduation (Figure 13). Of the 109 graduates who returned the Kolb post-graduation, 68.8% (n = 75) of the participants demonstrated a change in learning style (DLEARN) from the time they first took the Kolb within the first few weeks of the DPT program to the completion of the survey in April 2018. Interestingly, of the graduates who returned the survey, there was an increase in the frequency of the convergence and assimilation categories of learning styles moving from 48.5% of the in-program sample (n=167) to 68.2% of the post-graduation sample (n=109). This change in learning style conflicts
with Richardson (2011) who sites four longitudinal studies that support stability of students’ conceptions of their learning style from year to year as being stable over time, including a citation that reports that there was no significant difference in the reflections on learning inventory (RoLI) from year 1 to year 2 in physical therapy programs.

**Figure 13.** Kolb learning style of the UNM DPT Cohorts as recorded during enrollment in the program (n=167) and post-program (n=109).

Learning style change appeared to occur more often with students who did not pass the NPTE on the first attempt. This is outlined in Table 8. There was a larger percent of change seen in those that did not pass the NPTE on the first attempt (85.7%, n=7) than in those that passed the NPTE on the first attempt (67.6%, n=102) (Table 9).
Table 9

The Percentage Change in Learning Style (LS) from Entering the Program to Today
Comparing Group A (2012-2014) and Group B (2015-2017) UNM DPT Cohorts in Relationship To Passing the NPTE on the First Attempt

<table>
<thead>
<tr>
<th>LS % change (n=109)</th>
<th>Overall Change in LS per Group</th>
<th>Change in LS for those who passed the NPTE on first attempt (n=102)</th>
<th>Change in LS for those who DID NOT pass the NPTE on first attempt (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A (n=55)</td>
<td>70.9</td>
<td>68.75</td>
<td>85.7</td>
</tr>
<tr>
<td>Group B (n=54)</td>
<td>66.7</td>
<td>66.7</td>
<td>0</td>
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</table>

Of the seven students who did not pass the NPTE on the first attempt that returned the survey, all but one student changed their learning style. The one student who did not change their learning style was already declared as Converging and remained in that category post-graduation. Three of these graduates that did not pass the NPTE on their first attempt changed from Accommodating to either Assimilating or Converging. Two of the graduates who did not pass on their first attempt switched between Converging and Assimilating and only one graduate moved from Converging to Accommodating. In total, six out of the seven (85.7%) declared their learning style as assimilating or converging.

When looking at the change in learning style from cohort to cohort as seen in Figure 13, there does not appear to be a very large difference in the percentage of learning style change from initial declaration of the learning within the program to the new learning style inventory taken post-graduation related to cohort. The rate of return of the survey does not appear to be associated with this finding (Figure 14).
Figure 14. Percentage change in learning style (blue) from initial learning style declared within the UNM DPT program to the post-graduation results for the 2012-2017 cohorts with the survey rate of return superimposed in orange.

**Grit-S.** As part of the survey of graduates, I asked them to complete the 8-item Grit-S (scored from 1-5 with 5 meaning the person has more grit). This survey includes four items that are scored high on the positive agreement (very much like me = 5 points) and four items that are reverse scored on the negative agreement (not like me at all = 5 points). The graduates independently completed and scored this instrument. Because the scoring was not straight forward, I verified and corrected the self-score if the number of points for each question was transferred incorrectly by the graduate. The overall mean grit score was 3.958 ± .463 (n=108) with a range of 2.625 to 4.875 and a mode of 4.125. The overall statistics along with the subdivided Group A and Group B statistics are displayed in Table 10 and the mean grit score per cohort is presented in Figure 15. Of
interest, the two cohorts with the highest rate of return of the survey had higher mean grit scores and the two lowest rates of return had the lower mean grit scores.

Table 10

*Grit-s Overall Statistics as well as Group A and Group B Breakdown*

<table>
<thead>
<tr>
<th>Grit-S</th>
<th>Mean</th>
<th>SD</th>
<th>median</th>
<th>mode</th>
<th>range</th>
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</thead>
<tbody>
<tr>
<td>Overall (n=108)</td>
<td>3.958</td>
<td>0.463</td>
<td>4.0</td>
<td>4.125</td>
<td>2.625-4.875</td>
</tr>
<tr>
<td>Group A (n=54)</td>
<td>3.979</td>
<td>0.482</td>
<td>4.125</td>
<td>4.25</td>
<td>2.623-4.875</td>
</tr>
<tr>
<td>Group B (n=54)</td>
<td>3.838</td>
<td>0.446</td>
<td>3.875</td>
<td>3.875</td>
<td>3.0-4.75</td>
</tr>
</tbody>
</table>

*Figure 15.* Grit (mean) in blue as associated with each UNM DPT cohort with superimposed post-graduate survey rate of return in orange.

Within the entire sample of 167 graduates, 108 returned the Grit-s survey for a rate of return of 64.67%. Within the Group A and Group B combined cohorts, 50% (n=54) of the surveys returned were from Group A and B respectively. Of the 108 who returned the survey 93.52% (n=101) passed the NPTE on the first attempt and 6.48%
(n=7) did not pass on the first attempt. All people who returned the survey have passed the NPTE and are working as physical therapists.

As a comparison, the entire UNM DPT 2012-2017 NPTE sample pass rate was about 91%, which is lower than what is represented in the Grit survey. It appears that people who returned the survey were more likely to have passed on the first attempt. The grit score is reflective of only 46.6% (7/15) graduates who did not pass on their first attempt and it is missing the graduates who have yet to pass the NPTE (n=2). Within the sampled graduates, the mean Grit score was not affected by the success or nonsuccess of passing the NPTE on the first attempt. The mean grit score was similar to those that passed the NPTE on the first attempt to those that did not pass on the first attempt (Table 11). I performed a Chi square analysis of grit score for group A and B for those that passed on their first attempt of the NPTE and those that did not pass and there was no significant difference among the groups. It appears that within those sampled, that grit score is stable across the cohort groups and is not different for those who passed or did not pass the NPTE on their first attempt.

Table 11

*Grit-S scores for Those that Passed the NPTE on the First Attempt as Compared to Those that did not Pass the NPTE on the First Attempt*

<table>
<thead>
<tr>
<th>Grit-s</th>
<th>Did not pass (n=7)</th>
<th>Passed (n=101)</th>
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<tbody>
<tr>
<td>Mean</td>
<td>3.982</td>
<td>3.957</td>
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<tr>
<td>Median</td>
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<tr>
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</tbody>
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**Qualitative data.** Within the qualitative portion of the study, I asked two specific questions about learning style. While I did not address grit with a question, interviewees discussed elements of grit within their answers. I also heard elements of mindset, which relates to grit. From the summary results of the interviews, there were recurring themes that presented themselves in the interviews. Under learning style, there was a theme of group studying. Under mindset, there was a theme of belonging, well-being, and familial atmosphere.

*Learning style.* Overall, I learned from the majority of those that I interviewed that they made use of their known learning style. Many of the graduates felt that the program offered ample opportunity for multiple learning styles within the curriculum. Taking the learning style inventory at the start of the program assisted in a self-awareness of learning style and how to enhance their own learning within the program. The graduates were aware of others’ learning styles based on the initial lab and lecture that they all had within the first few weeks of the program. I heard from one graduate that they wished the program had been as intentional about learning style in the second and third years. However, they did feel that the faculty and the curriculum addressed all learners. Many expressed that having a mixed learning group at their anatomy table in the first semester of the program helped them to recognize and value alternative learning styles.

When I asked if learning style was a factor in their program success and NPTE success, one participant replied:

Yes, I think my learning style significantly impacted my success. One thing that was good about the program and how it pertains to the learning style is you've got
to learn [in] each of these different learning styles so you could sit back and listen
to lecture but you also were forced to get hands on and try things and observe.
They then went on to say that the program addressed their learning style “100%” and if
some aspect was not covered in their learning style, they would rely on a member of their
group to help translate the information to them in a different way.

*Group study.* Often in my conversation about learning style and ways they
were successful within the program and with the NPTE, the respondent would talk about
the groups they studied with. Almost the entire sample (88%) expressed that they did not
study in groups in their undergraduate education. One graduate expressed it well:

When I started PT school, I wasn't necessarily planning on having such an
established study group but it turned out that way and turned out to be so helpful.
But I think in the beginning, I was like ‘oh no I've got it by myself; I'll be fine; I'll
study on my own.’ I quickly realized it was a thousand times better to study with
other people.

When pressed about why they changed this study strategy in graduate school,
there were a variety of answers but the overarching theme related to the fact that they
knew they “could not do it alone.” They saw the enormity of the information they needed
to learn and recognized that others in their cohort were being successful with aspects they
might have struggled with. Some graduates recognized very early on in the program that
they were not being as successful as they had been in undergraduate studies. Often, it
was the first test or exam grade in Foundations or Anatomy that pushed them in this
group study direction. Many found groups that they held on to for their entire didactic
I definitely remember a specific moment in the first semester, it was during anatomy. I had gotten my first quiz or test result that was really surprising. It was that moment I learned that I had to completely change the way I studied. In undergrad, I relied a lot on memorization, reading material, memorizing material. I quickly learned a different kind of learning so I had to completely change my study methods. That meant spending even more time in the lab learning it, reaching out to friends/classmates studying in a group. That was a big moment and turn around.

Group study was often described in this way:

We got together throughout the three years constantly and then in preparation for the boards. Even before we graduated, we would get together every day of the week once school was done. There were five of us, sometimes more depending [on the day]. That was incredible, because we all learned differently. Some of us loved textbooks, some of us don't. Some of us loved the lecture, some of us don't. We really helped each other. I don't think I could have gotten through the program without studying with those people.

Another graduate described their differences as assets:

I think the biggest thing is we all had different areas of strength. One of us was really good at taking the information and making study guides out of what we had learned, and one of us was really good at putting it together with pictures. All of us had different areas that we were stronger in so we were really able to help each
other kind of get through the areas where we were weaker. All of us kind of had the same mentality about school, too, and about how we wanted to be successful, so we were willing to put in a lot of time. We put in a lot of study group time. We all had the same goals and worked really well together.

One graduate, when asked why they started studying in a group, said:

In undergrad, I was just a whole lot more busy. I just worked a lot and didn't have time to study with other people. The content that I was doing at that point I wasn't trying to remember it, I was trying to get through it so that I could take the test. It wasn't something I was trying to learn for long term necessarily, I just knew I needed to know that content to get through a test. I can't recall exactly how I used to study for that, [but I know] I didn't have a choice, I had to study on my own because I would go from one job to class to another job, come home try and sleep and then repeat. So, I just had to throw in studying whenever I could. I didn't have the amount of time that I had in grad school to actually study so with grad school I wasn't working so I could study the content to try and remember it. That was the main thing is I wanted this for long-term, whereas undergrad was ‘I need to get through the test’.”

I then asked this same person what changed that made them want to learn it for life.

I knew it was going to be a career type of deal. I wanted to know it so that I could apply it later, whereas some of the things I was doing in undergrad I knew I wasn't going to apply it later. I knew I wasn't going to go into economics or anything like that so in my econ class I was just doing what I needed to get done. I would get help here and there from a professor but other than that I would study
on my own, get it ready for the time period or test and that was kind of it. I knew I
wasn't going to use it as much later.

My last follow up asked them where they felt they got that drive to see the value in
changing how they learned.

Grades for the most part. I wasn't doing as well in the foundations course in the
beginning of our classes. I was trying to figure out how to study so that in itself
was a drag but I knew I needed to pass my boards and this was going to be a
career so I wanted to be good at that career because I try to be good at everything.
That's just my deal I like being good at sports, I like being good at school. I
wanted to be a good therapist so for me that was a drive to try and remember the
content, learn the content, so I could be good at it later.

Another set of graduates extended the group study efforts beyond the UNM
campus when they were all separated across the country doing their final clinical
rotations. They created a Facebook page and got together over Skype every other
weekend during their final clinical rotations. They coordinated taking the same practice
exam so that they then could have a group session to review the exam together. They
would share study tips on difficult questions using everyone’s learning style strengths.
Again, some would have detailed diagrams, others could summarize lecture material and
textbook information.

Of the graduates that struggled with passing either the PEAT, STEP or NPTE,
there was a theme of not working in groups as often as others. Some relayed that this
was a processing issue, that others processed faster so they would feel lost. Others
expressed concern of not contributing to the group or being afraid to expose their lack of
knowledge. Another graduate who struggled to pass stated that they tended to listen and not actively participate if in a group and thought that group work was not the best for them.

**Mindset.** There was a distinct difference in some of the graduates’ mindsets. On the whole, almost all of the graduates had a growth mindset. This was seen in their conversations related to failure. For many, their first “failure” occurred with an exam early on in the program. They talked about it being a wake-up call for change. Their reaction was to find a group that would help fill in the gaps of their knowledge.

For a few others, this appeared to begin an isolation path that continued throughout the program. Interestingly, if a graduate isolated themselves they often did not seek help from peers or faculty. It was those graduates who isolated themselves that struggled the most with passing, or just passing, the NPTE. One graduate reflected that they wish they had reached out to get support but “feared having to need it.”

**Belonging.** Of those interviewed, 100% talked about a sense of belonging. They all felt that they were close to their cohort and the faculty and staff. There was an “open door policy” and they knew they could ask any question of anyone. One graduate explained it this way:

I definitely felt that the small class size engendered a closeness and respect that fostered a competitive nature within me. It helped in keeping me from quitting after failing the first STEP exam just because I had that closeness of friendships and relationships with people in the class.”

They went on to say: “For the most part, in the first few months, every teacher I had, knew who I was [my name]. They would talk to me by my first name. That
engendered a personal relationship and I didn't want to let you guys down or let
go of that, so that helped me from quitting for sure.
Another graduate expressed this sense of belonging as it compared to others that they
knew in medical school:

I think having a small class was really helpful. My brother-in-law is in med
school and there's a hundred something people in his class and he doesn't even
know them. So, I would know that having my classmates to turn to, I knew all of
them personally, knew all of their personal lives, I knew I was not afraid to ask
anybody for help. I think that was important. Having an open door policy with all
of our professors made a big difference; being able to go to anybody for extra
help. Learning things, even from the class above us, being able to ask them
questions and (have them) provide guidance was important too and very helpful.

There was an overarching theme of support from their cohort and this willingness
to share knowledge and teach each other. “I think the caliber of the students and the
people that I studied with were also highly motivated and that helped to support my
motivation.” They also talked about the closeness that occurred in their cohort and that
the friends they made in this program are still very much a part of their lives.

There was a theme of working hard but also a feeling of belonging to a greater
group. This connectivity did not happen in undergraduate school. They spoke of the
program as being like a family, that they were a team working toward a common goal,
and that both professors and students were in this together. On the whole, this graduate’s
summation really says it all:
It was much more than just getting through the three years and getting your degree and going out there. It was why are you here? Why are you pursuing this career? It was fun. All of the professors made it fun. All of my classmates made it fun. It was a ride. I miss it. When you are in the program you just want out because you want to be a physical therapist but now I would love to go back to the classroom, it was a blast and it was very memorable in the situations and the experiences but more so just the people.

This sense of belonging may have hindered one graduate who had a fixed mindset and struggled to pass the NPTE on the first try:

I loved the tight knit family that we had as a program. I never felt like we were just in school we were very much a family. Maybe that could be another reason I was so fearful of seeking out attention for not understanding the material or not feeling confident because we were so close. I didn't ever want to seem like I didn't know.

While many spoke of the sense of belonging, there was one conversation that centered on the need to cross over from one cohort to the other. Related to crossover between the first, second, and third years in the DPT program:

I thought the crossover was okay at the beginning, when I was a first year I thought the crossover to the second year was decent, there were times when we were together whether it be through lunch or other school events but I didn't feel like we crossed over that much during the actual school time and I know when I was a third year I had absolutely nothing to do with the first years, I didn't even
really know any of them. There's a decent crossover from first to second but there's no crossover from third to first.

I asked for a suggestion as to what the program could do to improve that:

I don't know if there's any way that you could maybe set up certain times where you have a first and a third year contributing to something that you are doing where each year almost has a thing they could bring to the table based on what they are learning at that time so the third years obviously being more advanced are going to do more advanced work where the first years could contribute in some way where they can just hear the things that the second and third years are bringing to the table, I think that would be a good way to learn coming into the program.

Summary

This study was a mixed methods case study of the University of New Mexico DPT Program looking at six academic cohorts from 2012-2017. This study made use of cumulative data collected during the UNM DPT graduate’s time prior to admissions, at admissions, benchmark exams, and learning style recorded during the program, as well as data collected solely for the purpose of this study (revisited Kolb learning style and Grit-S). The purpose was to define characteristics of students who have successfully passed the NPTE on the first try.

In this chapter, I addressed the descriptive characteristics of the cohorts as a group (2012-2017), as well as two individual groups that were defined by the cohorts who did not have any form of the STEP exams (group A, 2012-2014) and those that had at least
one STEP exam (group B, 2015-2017). I also organized and analyzed both qualitative and quantitative data to develop answers to each research question.

The key findings were as follows:

- The cohorts do not reflect the ethnic breakdown for the State of New Mexico as the Hispanic population is underrepresented at 25% vs. 48.5% (United States Department of Commerce, 2017)
- The majority of the program’s graduates are reflective of “traditional students;” attending graduate school within 6.5 years of graduation from their undergraduate degree.
- The majority of the graduates are residents of New Mexico (89.2%) with most, (71.3%) attending in-state institutions for their undergraduate degree.
- The Group A and Group B cohorts were similar in terms of gender, ethnicity, undergraduate college attended, New Mexico residency and age. They also had similar mean professional GPAs.
- Admissions criteria were consistent within Group A and within Group B but not across the groups. There was a significant increase in mean GRE scores and mean prerequisite GPA from Group A to Group B, which is reflective of when the program changed the admissions criteria for the class of 2015.
- The STEP 1, STEP 2 and PEAT exams all had identical mean scores of 148 across the entire sample. Of the three exams, the PEAT had more variance but it also had the largest sample size.
• The first-time pass rate for the NPTE was 91% (n=152) for the entire sample. Group A had a lower percent of passing at 86.25% vs Group B was at 95.4% passing on the first attempt at the NPTE.

• Of the 9% (n=15) who had to take the NPTE more than once, 80% (n=12) are working as a physical therapist today. This means 3 graduates (~2% of total sample) never successfully passed the NPTE to attain their license.

• The programmatic NPTE scores have a normal distribution.

• There is a significant strong correlation between NPTE score and professional GPA, STEP 1 score, STEP 2 score and the PEAT scores.

• There is a significant strong correlation between STEP 1 and professional GPA and the PEAT scores.

• There was no significant relationship between passing or not passing the NPTE on the first try and race and gender.

Based on the Grit-s and Kolb surveys, I determined:

• There was a fairly consistent rate of return of the surveys within each cohort and within each Group A and Group B. The lowest returns were in the two recent graduating classes (2016 and 2017).

• The rate of return of the surveys was only 46.4% (n=7/15) for those not passing the NPTE on their first try vs a 67% (n=102/152) rate of return for those that passed on the first try. The group that did not pass on their first attempt was underrepresented in the survey results.
• The mean for Grit for the sample was 3.958. Mean grit was about the same for students who passed and students who did not pass on their first attempt.

• Mean grit scores were higher in the cohorts that had a higher rate of return of the surveys.

• Learning style made a substantial shift from the “thinking” learning styles of Accommodating and Diverging to more “reasoning” based learning styles of Assimilating and Converging with 68.8% of those who returned the survey having a change from their original learning style declared in the first semester of the program.

• Learning styles changed at a higher rate for those who did not pass the NPTE on their first attempt (85.7%, n=6/7).

Related to the graduates interviewed for the qualitative portion of the study, I found:

• Graduates expressed that they felt that the formal curriculum prepared them well for the NPTE.

• Graduates felt that they could trust the faculty. They highlighted that the faculty helped motivate them to do well, that the faculty supported them, and that they were flexible and gave quality instruction.

• Graduates found value in the board prep class, the STEP exams and the PEAT and felt that all prepared them to be successful on their first attempt at the NPTE. Graduates also expressed the importance of and the need for the exams to be high stakes to truly simulate the NPTE.
• The physical space and resources of the campus contributed to the graduate’s success.

• Group study was a significant part of their experience. Most graduates added group study to be successful in the program and in taking the NPTE. Most had not used group study during their undergraduate education.

• Study groups often reflected a recognition of learning style and many looked for diverse learning styles when forming their group.

• For the graduates who struggled to pass the NPTE, there was a general report that they often did not study in groups. They also tended to reflect a fixed mindset related to failure. They revealed that this fixed mindset occurred within and after the program. They recognized that to eventually be successful and pass the NPTE that they had to change their mindset.

• All graduates reported having a sense of belonging and a familial feeling related to their cohort and to the program.
Chapter 5

Discussion and Conclusions

Introduction

In the Doctor of Physical Therapy (DPT) curricula, in order to be deemed a successful candidate for licensure as a Doctor of Physical Therapy and therefore be employed as a physical therapist, the student must complete two to three years of didactic and clinical course work and pass the National Physical Therapy Examination (NPTE). While programs can regulate their own curricula within the accreditation standards set by a national regulatory body, Commission on Accreditation in Physical Therapy Education (CAPTE), they do not have access to, nor have any control over, the actual NPTE. This lack of connection to the NPTE makes it challenging for programs to know how to adapt their curriculum or admissions standards to ensure that those students who actually matriculate will eventually become physical therapists.

The NPTE is a high stakes examination, not only for its determination of who will or will not get a license, but also because of the actual cost to sit for the exam, the psychological impact of having to repeat the exam, and the burden of losing possible employment after failing the exam. At the University of New Mexico (UNM), it is not unheard of for students to complete the three years of the curriculum and never actually obtain a license to practice. When this occurs, it is ultimately a failure for the student, but in the end, it is also a failure of the program’s mission to graduate successful physical therapists and to provide healthcare for the State of New Mexico. To help meet the accreditation standards, and to decrease any financial and psychological burden that occurs from not passing the NPTE, the University of New Mexico program strives for as
close to 100% passage of the NPTE on the first attempt as possible. Preparing students for this success is therefore the ultimate goal and challenge.

**Summary of the study**

**Overview of the problem.** Not passing the NPTE has significant consequences. If a student does not pass the NPTE on the first attempt they can retake the examination, however a student may only take the examination a maximum of three times in any 12-month period and, effective January 2016, there is a 6-time lifetime limit on NPTE attempts (New Mexico Physical Therapy Board, 2016). Individual state boards have ultimate regulatory oversight on retakes and/or remediation. In the state of New Mexico, there is an in-depth remediation program, outlined in Appendix A (New Mexico Physical Therapy Board, 2016). Understanding the characteristics of students who successfully navigate the curriculum and pass the NPTE would be beneficial.

**Purpose statement and research questions.** The purpose of this study was to look at multiple variables that were presented as potential factors for success (admissions criteria, within program testing, hidden curriculum, personality traits such as grit and mindset, age and timeframe from undergraduate degree, and race/ethnicity) to determine their impact on successful first time passing of the NPTE within the case boundaries of the University of New Mexico DPT 2012-2017 cohorts.

This study underlined the important characteristics of admissions and the curriculum, as well as student characteristics, that may lead to successful first time passage of the NPTE. Through study of the quantitative measures that were accessible, such as admissions criteria and cumulative in-program comprehensive examinations (STEP exams and PEAT exam), as well as qualitative aspects of students who were both
successful and not successful in their first attempt at the NPTE, I explored the potential predictors of success that may frame admissions policies and within curriculum policies, to reach the goal of having a graduate pass the NPTE on the first attempt.

This study will assist the UNM DPT program in admissions review to match the best student to the educational mission while attending to the accreditation standards requiring high first time passing rates on the NPTE. This study will also give the program additional insight into what factors help a student successfully matriculate and become an effective physical therapist serving the State of New Mexico, its primary mission.

Given this information, my research questions were:

1. What are the relationships between NPTE scores/first time passing and the UNM admission criteria, age, gender, race/ethnicity, STEP scores, and PEAT score?
2. What are the potential areas of the curriculum that may be contributing to NPTE scores or students either passing or not passing the NPTE on first try?
3. Are there components of personality, grit or learning styles that may be contributing to the NPTE score and students either passing or not passing the NPTE on the first try?

**Review of Methodology**

**Mixed methods design.** This study was a programmatic evaluation intrinsic case study design bounded with one physical therapy program over a six-year span (Creswell, 2013). I used a cross-case synthesis design looking at samples from each of the six cohorts (Yin, 2014, p. 221). The UNM physical therapy program was the case of interest.
Given the complexity of the research questions for this proposal, this approach gave me the best view of a very fluid educational program.

Using case study design allowed an “in-depth (and close-up) examination of the program within its real-world context” (Yin, 2014, p. 220). This captured the complexity of the case within the context of the changes to the curriculum over time as well as allowed me to look for interactions or extraneous variables contributing to the graduate’s success.

The bounding of the case over this six-year time span is significant because it included the first six years (cohorts) of the DPT curriculum at UNM. In addition, during this period, three of the class cohorts experienced the curriculum without the STEP exams and three of the cohorts experienced the curriculum with either one or both STEP exams. All six cohorts participated in the PEAT before taking the NPTE. This case study evaluation approach allowed a focus on the initiation of the STEP exams, studying the implementation of the STEP exams in the course of this bounded period with comparisons in cohorts that did or did not have the exams (Yin, 2014, p. 222). It also allowed a focus on outcomes, the passing of the NPTE. By using a case study, I was able to explain the possible links between the initiative and the outcome (Yin, 2014, pp. 224–225).

Qualitative data collection. After creating a stratified sample based on NPTE score, I interviewed an equal number of students (n = 3) from all the cohorts within the study (classes of 2012-2017). The eighteen interviews were organized into the subject items of the questions and then coded (Saldaña, 2016). Emergent themes were grouped and described (Creswell & Creswell, 2013).
Quantitative data collection. I used an aggregate sample of admissions criteria, in program testing database, and final GPA and NPTE exam scores from the DPT classes of 2012-2017 (n=167). For analysis, I divided the six-cohort sample into two groups: those that did not have the STEP exams (Group A, classes of 2012-2014) and those that had one or more of the STEP exams (Group B, classes of 2015-2017) The dependent variable was the first attempt score of the National Physical Therapy Exam (NPTE). I made use of SPSS to calculate the descriptive statistics and study the relationships among the variables.

Major findings

The programmatic NPTE scores have a normal distribution across the combined six cohorts. The first-time pass rate for the NPTE was 91% (n = 152) for the entire sample. Group A had a lower percent of passing at 86.25% vs Group B at 95.4% passing on the first attempt at the NPTE. Admissions criteria were consistent within Group A and within Group B but not across the groups. There was a significant increase in mean GRE scores and mean prerequisite GPA from Group A to Group B, which is reflective of when the program changed the admissions criteria for the class of 2015. The Group A and Group B cohorts were similar in terms of gender, ethnicity, undergraduate college attended, New Mexico residency, and age. They also had similar mean professional GPAs. Was it the change in admissions criteria that helped Group B have a better success rate at passing the NPTE on the first attempt or was it the institution of the STEP exams given to Group B and not to Group A? The similarity of the groups, down to the almost identical professional GPA suggests that there is stability in the type of student the program is attracting and admitting and that Group A and Group B differences may not
be related to just the admissions criteria, but rather to the institution of the STEP exams or a combination of the two changes together.

The STEP exams appear to be reliable over time. The STEP 1, STEP 2 and PEAT exams all had identical mean scores of 148 across the entire sample. Of the three exams, the PEAT had more variance but it also had the largest sample size. As might be expected, there was a strong correlation between the NPTE score and the professional GPA. That is, if a student did well in the program, they also did well on the NPTE. Of interest, the NPTE score was strongly correlated to STEP 1 (0.81), STEP 2 (0.56) and PEAT (0.56) exams and STEP 1 was strongly correlated (0.52) to the PEAT (a retired NPTE exam). Of interest, the reported internal consistency reliability KR20 (Kuder-Richardson Formula 0.00-1.00) on the STEP 1 exams taken during this period has ranged from 0.81-0.84 while the STEP 2 exam during the same period had a KR20 range of 0.69-0.71, suggesting that the STEP 1 exam might be a more reliable exam than the STEP 2. This suggests that the benchmark exams may be valid indicators of successful passing of the NPTE.

Graduates found value in the board prep class, the STEP exams and the PEAT and felt that all prepared them to be successful on their first attempt at the NPTE. Graduates also expressed the importance of and the need for the exams to be high stakes to truly simulate the NPTE. This supports the findings that assessments can be a positive learning experience and that students need “objective feedback to improve their performance” (Norman et al., 2010, p. 496). It was this study that found “periodic progress testing with feedback, was associated with significant and large positive effects
on performance on the licensing examination” (Norman et al., 2010, p. 498). It appears that the UNM DPT programs STEP exams may be fulfilling this role.

It was not surprising to see that the majority of those who completed the survey in this study have a strong grit score. The mean grit score for the sample was 3.958. Mean grit was about the same for students who passed and students who did not pass on their first attempt. Adults with more grit progress farther in their education and make fewer career changes (Duckworth & Quinn, 2009). Conscientiousness, a personality trait as measured by the Big Five Inventory, has a strong correlation with grit ($r=0.59$) (Duckworth & Quinn, 2009). In adolescents, grittier individuals have higher GPA and persist to attain a goal (as seen with National Spelling Bee contestants). In a study looking at retention in military cadets at West Point, grittier individuals were less likely to drop out during the first year summer training (Duckworth et al., 2007; Duckworth & Quinn, 2009). Grit relates to perseverance and reaching for long-term goals, which is certainly a description of graduates of a DPT program (Duckworth et al., 2007). The lack of grit scores from those graduates who never passed the NPTE makes it difficult to conclude if grit is related to eventual passing of the NPTE. Grit is certainly high for the group of individuals who eventually completed the DPT program and successfully attained a license to practice, whether they took the NPTE multiple times or not.

Of the graduates that returned the Kolb learning style survey, 68.2% ($n=73/107$) had a change in their original learning style preference. Learning styles changed at a higher rate for those who did not pass the NPTE on their first attempt (85.7%, $n=6/7$). According to a study looking at critical thinking in nursing students, a Converging learning style, followed by Assimilating learning style have the strongest correlation to
critical thinking scores (Gyeong & Myung, 2008). It is of interest that of the graduates that returned the Kolb survey, the change in the combined Converging and Assimilating learning styles went from 48.5% of the sample to 68.2% of the return sample. What is not known is when this learning style change occurred. This shift in learning style refutes the declaration that in higher education, learning styles are relatively stable (Richardson, 2011). Richardson (2011) cites four longitudinal studies that support stability of students’ conceptions of their learning style from year to year as stable over time, including a citation that reports that there was no significant difference in the reflections on learning inventory (RoLI) from year 1 to year 2 in physical therapy programs. It would be interesting to begin tracking learning style each year within the UNM DPT program to formulate when this change occurs.

Hafferty and O’Donnell’s text, *The Hidden Curriculum in Health Professional Education*, outlines that the hidden curriculum teaching occurs, in part, through interpersonal interactions between faculty, near-peers and peers and clinical instructors (Hafferty & O’Donnell, 2014, Chapter 11). Student treatment and mistreatment, feedback and evaluation are all a part of the culture of the hidden curriculum (Hafferty & O’Donnell, 2014).

Dutton and Sellheim (2014) wrote about the hidden and informal curriculum found in physical therapy programs. Prior to their work, this dialog had never been reported in physical therapy educational literature. Their results indicated that physical therapy students at the three programs surveyed do indeed recognize the presence of hidden and informal curricula. They found that student learning is certainly impacted by the presence of this curriculum. Most of their work centered on finding themes of
influence on the core values of compassion/caring, excellence, integrity and professional duty. They looked for internal and hidden curricular influences related to these core values.

This study confirms the presence of a hidden curriculum in physical therapy education. Graduate reflection indicated that the hidden curriculum was thought to be a large reason for their success on the NPTE. For these graduates, the emphasis of the hidden curriculum was on the interpersonal relationships with faculty and the supportive campus atmosphere that made them feel comfortable and at home. All graduates reported having a sense of belonging and a familial feeling related to their cohort and to the program. Graduates felt that they could trust the faculty and related that they knew that they could trust what was being taught to them. They highlighted that the faculty helped motivate them to do well and that the faculty supported them as individuals. They reported that the faculty was available, flexible, and delivered quality instruction.

**Unexpected Findings**

**Mindset.** My interviews with those who were not successful in passing the NPTE revealed a notable commonality, a fear of failure. These graduates related that this fear began within the program. This fixed mindset, that failure was not acceptable, created an isolation effect for the graduates. They tended to work alone and did not seek help from professors or classmates for fear that they would be thought of as unintelligent or not successful. In retrospect, these graduates recognized that their mindset issue related to their own inability to reach out, and was not due to a lack of support from the program. Many talked about how this fixed mindset set them up for failure on the NPTE. Each of the graduates who struggled to pass stated that they needed to change this mindset in
order to eventually be successful. They did this through the use of sports psychologists and coaching after graduation. They expressed that they wish they had figured out the need to change their mindset earlier.

When an academic environment communicates a growth mindset to its students, students are more successful. Students can be taught how to achieve a growth mindset with simple on-line training that includes information about the brain and learning (Rattan et al., 2015). Students can be taught that intellectual abilities can be developed with “hard work, better learning strategies and help from others” (Rattan et al., 2015, p. 722). Use of this on-line training may assist programs in recognizing and changing a fixed mindset early on and possibly prevent failure due to the fixed mindset of graduates.

**Group study.** Group study was a significant part of experience of graduates from the UNM DPT program. Most graduates had not used group study during their undergraduate education and reported that they added group study in order to be successful in the program and in taking the NPTE. Study groups often reflected a recognition of learning style and many looked for diverse learning styles when forming their group. Graduates reported that there was so much to learn and the curriculum was so intense that group study was the only way they could learn it all. For many, it was an unsuccessful first exam that led them to this conclusion. For the graduates who struggled to pass the NPTE, there was a general report that they often did not study in groups.

**Conclusions**

This case study has valuable implications for the UNM DPT program related to admissions, program success, and post program success of their graduates. Most literature related to PT graduates’ NPTE success cites only quantitative data as predictors
for success on the NPTE. One study sites undergraduate GPA, GRE scores, and race and ethnicity as useful data for estimating a student’s risk of failure on the NPTE (Utzman et al., 2007). Another study cited pre-admission GPA as being statistically related to NPTE scores (Theiman, Weddle, & Moore, 2003). Another study indicated that “academic difficulty during the student’s professional training was an independent predictor for NPTE failure” (Riddle et al., 2009, p. 1182). Another study looked at a large sample from the Physical Therapist Centralized Application Service (PTCAS) to glean predictive variables for successful admissions to a PT program and not surprisingly found that the science GPA was the greatest predictor of admissions to a PT program (Nuciforo et al., 2014). There is only one study that speaks of hidden curriculum within PT education (Dutton & Sellheim, 2014) and there is no known PT literature on grit. There are no known studies that look at both admissions criteria and in program criteria in totality and there does not appear to be any qualitative studies reported related to successful passing of the NPTE. While this study is limited in generalizability, it is significant for the information that it contributes to the known PT literature.

Implications for Action

The UNM DPT program made substantial changes to their admissions criteria for the incoming class of 2015. This change occurred in parallel with the institution of the benchmark exams, the STEP 1 and STEP 2. Despite this change in admissions criteria from Group A to Group B, elevating the GRE and science GPA requirements, the mean professional GPA of the graduates in Group A and Group B were basically identical. What is significant is that with this change, there was a decrease in the number of failures of the NPTE with the first attempt passing increasing from 86.3% in Group A to 95.4% in
group B. It is apparent that there was an improvement in success but it is impossible to say which variable is driving the change, the admissions criteria or the benchmark exams. Since changing the admissions criteria did not change the demographics of the class related to race and gender, I would recommend that the admissions criteria remain as they were for the incoming class of 2015. Further, because the graduates perceive that the STEP and PEAT exams helped them be successful on the NPTE, I would recommend the continuation of these exams.

The UNM DPT program completes exit interviews with all graduates on the last day of the curriculum before graduation to assess strengths and weaknesses of the program. They also anonymously survey all graduates concerning the quality of the curriculum that they experienced. It was apparent that some issues reported by the interviewed graduates had also been reported in the exit interview and surveys because changes were made appropriately and in a timely manner. I would recommend that the UNM DPT program continue their exit interviewing of students. From the interviews, it is apparent that the information received during these student exit interviews are significant and act as a way to stay current with issues as they present in the curriculum.

The UNM DPT program has a very stable faculty that is supportive of the student body. As gleaned from this study, faculty support was a significant positive reason for student success. I would recommend that the Division continue to recruit, retain and support qualified faculty. It is imperative that faculty are supported with professional development to support continuous improvement of the program.
Recommendations for Further Research

Continued research should occur related to learning style in physical therapy programs. I would suggest for the UNM DPT program that learning style be retested each year to ascertain if there is change occurring during or after the program. I would also suggest that grit continue to be measured and studied within the UNM DPT program to ascertain if the “gritty” trend seen in this study is apparent within the program, not just after the program. It would be interesting to see if grit is stable over time while the student is within the program.

Exploring how personality related to the Big-Five factors plays a part in the ability to pass the NPTE on the first try may be worthwhile. In addition, exploring the implementation of the on-line mindset training program outlined in the literature (Rattan et al., 2015) and studying if this has an effect on first time pass rate would be important.

Concluding Remarks

The wealth of information attained from this case study has broad implications. A mixed methods study is not often seen in the physical therapy and medical education literature. It was during the qualitative part of this study that I encountered the most surprising findings that of group study practices and mindset challenges. I would recommend that researchers embrace this mixed approach to further our knowledge of PT and medical education pedagogy and aspects of hidden curriculum.
Appendices

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<th>Appendix</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>New Mexico Remediation and Re-examination Criteria for Failing the NPTE</td>
</tr>
<tr>
<td>Appendix B</td>
<td>IRB Approval Letter</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Kolb Learning Style Inventory Survey</td>
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<td>Appendix D</td>
<td>Grit-s Survey</td>
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<td>Appendix E</td>
<td>GRE Concordance Tables for Tests Taken Before 2012</td>
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<td>Appendix F</td>
<td>GRE Concordance Tables for Tests Taken from 2012-2014</td>
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<tr>
<td>Appendix G</td>
<td>Code Book</td>
</tr>
<tr>
<td>Appendix H</td>
<td>Pearson’s Correlation Matrix</td>
</tr>
</tbody>
</table>
Appendix A

New Mexico Remediation and Re-examination Criteria for Failing the NPTE

Please note prior to completing the following remedial work, the applicant must submit a letter to the NM PT Board that outlines the following steps that must be completed for the applicant to sit for the National Physical Therapy Exam for PT/PTA. This process must be approved by the NM PT Board before the applicant can initiate this plan.

Criteria for Remedial Work

<table>
<thead>
<tr>
<th>NUMBER OF FAILURES</th>
<th>NUMBER OF POINTS FROM PASSING</th>
<th>MENTORSHIP</th>
<th>TUTORIAL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Score is within 6 points of passing</td>
<td>20 hours either mentorship or tutorial or any combination of both mentoring or tutorial</td>
<td>Proof of exam review course</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Score is greater than 6 points of passing</td>
<td>40 hours either mentorship or tutorial or any combination of mentoring &amp; tutorial</td>
<td>Proof of exam review course</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Score is within 6 points of passing</td>
<td>20 hours mentorship</td>
<td>60 hours tutorial</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Score is greater than 6 points of passing</td>
<td>60 hours mentorship</td>
<td>60 hours tutorial</td>
<td>None</td>
</tr>
</tbody>
</table>

After the fourth failure of the NPTE for PT/PTA applicants, the applicant must complete the following remedial work to sit for the exam:

1. Letter confirming completion of remedial clinical mentorship with a licensed PT/PTA Supervisor for:
   a. 160 hours in an outpatient clinic/facility
   b. 160 hours in an inpatient/rehabilitation clinic/facility
   c. 160 hours in a clinic/facility of their choice
2. Letter confirming (with both scores listed) from the completion of the National License Review and PEAT exam.
   a. Applicant must retake the National License Review and PEAT exam

(New Mexico Physical Therapy Board, 2016)
Appendix B

IRB Approval

OFFICE OF THE INSTITUTIONAL REVIEW BOARD

DATE: February 20, 2018
IRB #: 24417
IRBNet ID & TITLE: [1168786-4] A case study of the characteristics for successful first time passing of the national physical therapy examination at the University of New Mexico
PI OF RECORD: Allison Borden
SUBMISSION TYPE: Response/Follow-Up
BOARD DECISION: APPROVED
EFFECTIVE DATE: February 15, 2018
EXPIRATION DATE: February 14, 2019
RISK LEVEL: Minimal Risk
PROJECT STATUS: Active - Open to Enrollment

DOCUMENTS:
- Letter - Point by Point Letter (UPDATED: 02/15/2018)
- Protocol - Protocol (UPDATED: 02/15/2018)

Thank you for your Response/Follow-Up submission. The UNM IRB has APPROVED your submission. This approval is based on an acceptable risk/benefit ratio and a project design wherein the risks to participants have been minimized. This project is not covered by UNM’s Federalwide Assurance (FWA) and will not receive federal funding.

The IRB has determined the following:

- Informed consent must be obtained and documentation is required for this project. To obtain and document consent, use only approved consent document(s).
- Informed consent has been waived for the collection of programatic data.
- FERPA applies to the project.

This determination applies only to the activities described in the submission and does not apply should any changes be made to this research. If changes are being considered, it is the responsibility of the Principal Investigator to submit an amendment to this project and receive IRB approval prior to implementing the changes. A change in the research may disqualify this research from the current review category. If federal funding will be sought for this project, an amendment must be submitted so that the project can be reviewed under relevant federal regulations.

All reportable events must be promptly reported to the UNM IRB, including: UNANTICIPATED PROBLEMS involving risks to participants or others, SERIOUS or UNEXPECTED adverse events, NONCOMPLIANCE issues, and participant COMPLAINTS.

If an expiration date is noted above, a continuing review or closure submission is due no later than 30 days before the expiration date. It is the responsibility of the Principal Investigator to apply for continuing review or closure and receive approval for the duration of this project. If the IRB approval for this project expires, all research related activities must stop and further action will be required by the IRB.
Please use the appropriate reporting forms and procedures to request amendments, continuing review, closure, and reporting of events for this project. Refer to the OIRB website for forms and guidance on submissions.

Please note that all IRB records must be retained for a minimum of three years after the closure of this project.

The Office of the IRB can be contacted through: mail at MSC02 1665, 1 University of New Mexico, Albuquerque, NM 87131-0001; phone at 505.277.2644; email at irbmaincampus@unm.edu; or in-person at 1805 Sigma Chi Rd. NE, Albuquerque, NM 87106. You can also visit the OIRB website at irb.unm.edu.
Appendix C

Name: ______________________

Learning Style Inventory

Instructions: It will take 20-30 minutes to complete the Learning Style Inventory. As you complete the Learning Style Inventory remember that there are no right or wrong answers. The Inventory gives you an idea of how you learn; it does not evaluate your learning ability.

1. Rank order each set of four works (going across) in the 10 items listed below. Assign a 4 to the word which is most like you, a 3 to the next best, a 2 to the next, and a 1 to the least like you. Assign a different number to each of the four words. Do not make ties.

<table>
<thead>
<tr>
<th>When I learn</th>
<th>I like to deal with my feelings</th>
<th>I like to think about ideas</th>
<th>I like to be doing things</th>
<th>I like to watch and listen</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learn best when</td>
<td>I trust my hunches and feelings</td>
<td>I rely on logical thinking</td>
<td>I work hard to get things done</td>
<td>I listen and watch carefully</td>
</tr>
<tr>
<td>When I am learning</td>
<td>I have strong feelings and reactions</td>
<td>I tend to reason things out</td>
<td>I am responsible about things</td>
<td>I am quiet and reserved</td>
</tr>
<tr>
<td>I learn by</td>
<td>feeling</td>
<td>thinking</td>
<td>doing</td>
<td>watching</td>
</tr>
<tr>
<td>When I learn</td>
<td>I am open to new experiences</td>
<td>I like to analyze things, break them down into their parts</td>
<td>I like to try things out</td>
<td>I look at all sides of issues</td>
</tr>
<tr>
<td>When I am learning</td>
<td>I am an intuitive person</td>
<td>I am a logical person</td>
<td>I am an active person</td>
<td>I am an observing person</td>
</tr>
<tr>
<td>I learn best from</td>
<td>Personal relationships</td>
<td>Rational theories</td>
<td>A chance to try out and practice</td>
<td>observation</td>
</tr>
<tr>
<td>When I learn</td>
<td>I fell personally involved in things</td>
<td>I like ideas and theories</td>
<td>I like to see results from my work</td>
<td>I take my time before acting</td>
</tr>
<tr>
<td>I learn best when</td>
<td>I rely on my feelings</td>
<td>I rely on my ideas</td>
<td>I can try things out for myself</td>
<td>I rely on my observation</td>
</tr>
<tr>
<td>When I am learning</td>
<td>I am an accepting person</td>
<td>I am a rational person</td>
<td>I am a responsible person</td>
<td>I am a reserved person</td>
</tr>
<tr>
<td>When I learn</td>
<td>I get involved</td>
<td>I evaluate things</td>
<td>I like to be active</td>
<td>I like to observe</td>
</tr>
<tr>
<td>I learn best when</td>
<td>A am receptive and open-minded</td>
<td>I analyze things</td>
<td>I am practical</td>
<td>I am careful</td>
</tr>
<tr>
<td>Total</td>
<td>CE</td>
<td>AC</td>
<td>AE</td>
<td>RO</td>
</tr>
</tbody>
</table>
2. Total the rank numbers you have given to the ten words in each of the four columns (add all of your scores going down). The sum of the first column gives you your score on CE: Concrete Experience; the second column gives you your score on AC: Abstract Conceptualization; your score on the third column is for AE: Active Experimentation; and the fourth column is your score on RO: Reflective Observation. Each column should have a score from 12-48. The total for all four columns should add up to 120.

3. Calculate AC-CE=______________ - __________ = __________

4. Calculate AE-RO=______________ - __________ = __________

5. Researcher to complete: learning style preference is (circle one)

   • divergent,
   • assimilative
   • convergent
   • accommodating

Created from:


http://med.fau.edu/students/md_m1_orientation/M1%20Kolb%20Learning%20Style%20Inventory.pdf retrieved December 7, 2017
Appendix D

Short Grit Scale

*Directions for taking the Grit Scale: Please respond to the following 8 items. Be honest - there are no right or wrong answers.*

1. New ideas and projects sometimes distract me from previous ones.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

2. Setbacks don't discourage me.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

3. I have been obsessed with a certain idea or project for a short time but later lost interest.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

4. I am a hard worker.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

5. I often set a goal but later choose to pursue a different one.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

6. I have difficulty maintaining my focus on projects that take more than a few months to complete.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all
7. I finish whatever I begin.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

8. I am diligent.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

**Scoring:**

1. For questions 2, 4, 7 and 8 assign the following points:
   - 5 = Very much like me
   - 4 = Mostly like me
   - 3 = Somewhat like me
   - 2 = Not much like me
   - 1 = Not like me at all

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Total#1</strong></td>
<td></td>
</tr>
</tbody>
</table>

2. For questions 1, 3, 5 and 6 assign the following points:
   - 1 = Very much like me
   - 2 = Mostly like me
   - 3 = Somewhat like me
   - 4 = Not much like me
   - 5 = Not like me at all

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Total#2</strong></td>
<td></td>
</tr>
</tbody>
</table>

3. Final total = Total #1 + Total #2 = \[ \frac{\text{Total #1} + \text{Total #2}}{8} = \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \]

Add up all the points and divide by 8. The maximum score on this scale is 5 (extremely gritty), and the lowest score on this scale is 1 (not at all gritty).

Adapted from:


### Table 1B: Verbal Reasoning Concordance Table

<table>
<thead>
<tr>
<th>Prior Scale</th>
<th>New Scale</th>
<th>% Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>590</td>
<td>159</td>
<td>80</td>
</tr>
<tr>
<td>580</td>
<td>158</td>
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<td>61</td>
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<tr>
<td>500</td>
<td>153</td>
<td>57</td>
</tr>
</tbody>
</table>

*Based on the performance of all examinees who tested between August 1, 2011 and April 30, 2012. Percentile ranks will be updated in July 2013.*

---

**Appendix E**

GRE Concordance tables for Tests Taken Before 2012
### Table 1E: Quantitative Reasoning Concordance Table

<table>
<thead>
<tr>
<th>Prior Scale</th>
<th>New Scale</th>
<th>% Rank*</th>
</tr>
</thead>
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<td>760</td>
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### Quantitative Reasoning Concordance Table (continued)

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<th>New Scale</th>
<th>% Rank</th>
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<td>200</td>
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</table>

Note: Score users should use special care in evaluating test takers who received a Quantitative Reasoning score at the top end of the prior 200-800 score scale. Now, with the new 130-170 score scale, we can provide more differentiation for higher ability test takers. However, test takers who took the prior test and received an 800 on the Quantitative Reasoning measure, received the highest score possible that they were able to earn on the measure. Therefore, this information should be considered when making admissions decisions.

*Based on the performance of all examinees who tested between August 1, 2011 and April 20, 2012. Percentile ranks will be updated in July 2013.
Appendix F

GRE Concordance Tables for Tests Taken from 2012-2014

### Table 1A: Verbal Reasoning and Quantitative Reasoning
Interpretative Data Used on Score Reports
(Based on the performance of all individuals who tested between August 1, 2011 and June 30, 2014)

<table>
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<th>Scaled Score</th>
<th>Percent of Test Takers Scoring Lower than Selected Scaled Scores</th>
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### Table 1B: Analytical Writing Interpretative Data
Used on Score Reports
(Based on the performance of all individuals who tested between August 1, 2011 and June 30, 2014)

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<th>Percent of Test Takers Scoring Lower than Selected Score</th>
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### Table 1C: Performance Statistics on the GRE Revised General Test*

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<th></th>
<th>Verbal Reasoning</th>
<th>Quantitative Reasoning</th>
<th>Analytical Writing</th>
</tr>
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<td>Number of Test Takers</td>
<td>1,585,380</td>
<td>1,587,610</td>
<td>1,579,773</td>
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<td>Mean Standard Deviation</td>
<td>150</td>
<td>152</td>
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<tr>
<td>Percent Women</td>
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<td>43</td>
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</table>

*Six percent of test takers did not provide any classifications with regard to gender.
Appendix G

Code Book

| Dataset | Aggregate Admissions, National Physical Therapy Exam (NPTE) and STEP and PEAT Exams Database  
|         | University of New Mexico, Doctor of Physical Therapy (DPT) 2012-2017 |
| Overview | A Study of Predictive Success on the National Physical Therapy Exam |
| Source | DPT Admissions data and DPT aggregate data for the professional program |
| Sample Size | 167 |
| Updated | May 30, 2017AdmissionsUNMDPTwithcasesremoved.sav |

Structure of the Dataset

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<th>Variable Description</th>
<th>Variable Metric/Labels</th>
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<td>DPT graduating class year coded</td>
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<td>YOB</td>
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<td>Year</td>
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<td>4</td>
<td>GENDER</td>
<td>Student gender</td>
<td>1 = female, 0 = male</td>
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<td>Year of undergraduate degree award</td>
<td>Year</td>
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<td>score</td>
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<td>Percentile</td>
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<td>Percentile of highest verbal GRE score</td>
<td>Percentile</td>
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<td>Prerequisite GPA</td>
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<td>uGPA</td>
<td>Undergraduate GPA as reported on final transcript</td>
<td>score</td>
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<td>14</td>
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<td>Cumulative GPA of all classes taken</td>
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<td>Professional programmatic GPA</td>
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<td>The time lag from undergraduate degree to DPT degree completion</td>
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### Appendix H

#### Estimated Correlations

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<th>GRE V %</th>
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<th>uGPA</th>
<th>cGPA</th>
<th>pGPA</th>
<th>Step 1 score</th>
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</table>

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).
References


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