



March 2020

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Recommended Citation

Richardson S, Zemanek Z, Downen T, Rich C, Weltzin N. The Effect of Extraversion On Practical Examination Scores in Students of Physical Therapy. *The Internet Journal of Allied Health Sciences and Practice*. 2020 Mar 17;18(2), Article 11.

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Abstract

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The Internet Journal of Allied Health Sciences and Practice

Dedicated to allied health professional practice and education

Vol. 18 No. 2 ISSN 1540-580X

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ABSTRACT

Purpose: The purpose of this study was to determine whether a physical therapy student's level of extraversion positively correlates to practical exam scores. **Methods:** Participants were a convenience sample recruited from the classes of 2018 and 2019 in the Doctor of Physical Therapy program at Franklin Pierce University in Goodyear, Arizona. Subjects completed the Goldberg's Big-Five Factor Marker questionnaire as a measure of introversion/extraversion. These scores were compared with participants' practical exam scores using a Spearman Rho statistical test with data analysis completed using SPSS software. **Results:** 60 participants (31 males, 29 females) with mean extraversion score (32.97+/-7.90, $p=.27$) and practical examination score (93.00 +/- 2.44, $p=.08$). Spearman Rho correlation was .282 ($p = .031$). **Conclusions:** A significant positive correlation between extraversion and practical examination scores in physical therapy students was found. Educators can use these findings to provide resources to students to assist with practical examination performance.

Keywords: practical examination, extraversion, physical therapy

INTRODUCTION

Students completing DPT curricula identify at different points along the continuum of introverted or extroverted personality types. Both personality types have strengths that promote success of DPT students. Practical examinations are an integral part of the training and preparation of DPT students. Based on the patient interaction and verbalization skills needed during practical examinations, do more extroverted students perform better on practical examinations? If this is true, then perhaps resources can be provided to more introverted students to assist with their practical examination performance. Research has shown that medical students can improve their patient interaction skills with specific training.^{1,2} Little, if any, research has been performed documenting which factors play a significant role in determining a physical therapy student's success in practical examinations.

Given the interpersonal skills required for practical examinations, it is likely that extraversion personality traits may play a role in a student's success. Previous research has found that physical therapy students generally score highly in extraversion personality trait.^{3,4} For this reason, the choice was made to examine the effects of extraversion on physical therapy student practical examination success. The purpose of this study is to determine whether a physical therapy student's level of extraversion positively correlates to practical exam scores.

Research defining personality characteristics led to the development of a Five-Factor Model as a "Grand Unified Theory for Personality."^{5,7} This Five-Factor Model assumes that five broad traits are able to accurately describe personality and thus human behavior. These traits include openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Extraversion is related to sociability, high energy, and enthusiasm, as well as the propensity of finding enjoyment in human interaction.^{5,6}

A study done by De Raad and Schouwenburg showed that personality traits are expressed in learning styles and that these learning styles relate to feelings of self-efficacy in academic settings.⁸ By taking into account the effect that personality traits can have on academic performance, professors can create a learning environment better tailored to promote success for different learning styles. Further, resources can be provided to students to assist them to maximize their academic performance. Felder, Felder, and Dietz showed that personality type testing is a useful tool for helping instructors to design instructional materials that can benefit their students.⁹ Davidson et al examined the performance of medical students who self-identified as having an introvert personality type.¹⁰ There were different aspects of medical school training where introverted students performed at higher levels, while clerkship experiences were more challenging.¹⁰ While written examinations favor introspection, clinical environments as well as practical examinations require a high level of social skills to facilitate positive patient-practitioner interactions.

There are several open access self-report tests and surveys available to accurately assess an individual's personality. Goldberg's Big Five Personality test is a well-researched and reliably validated self-report questionnaire demonstrating internal consistency.⁹ Maples et al demonstrate that the tool is desirable, indicating that this test is "free to use and can be modified to accommodate its user's needs."¹² Studies by Griffin and Wilson as well as Jerant et al found that using Goldberg's Big Five Personality test was a useful tool to evaluate personality type during healthcare interviews.^{13,14} Goldberg identified the questions to be used to measure extraversion.¹⁵ Using this metric, extraversion is associated with enthusiasm, cheerfulness, energy, and tendency to be personable, friendly, and assertive.¹⁵

In summary, the evidence presented suggests that information related to personality traits can assist educators to modify learning environments to benefit students. The authors of the present study suggest that resources can also be provided to students to assist them in their studies. Little research has been performed examining personality and a student of physical therapy's success in their graduate course work, let alone on their practical examinations. It is therefore the purpose of this research to examine the effects of extraversion on a physical therapy student's practical examination scores.

METHODS

Participants

Participants were a convenience sample of 60 student volunteers (31 female, 29 male) with age range 23-43 years old, recruited from the 2018 (second-year students) and 2019 (first-year students) Franklin Pierce University Doctor of Physical Therapy Program at the Arizona Campus.

Data Collection

Approval from the Franklin Pierce University Institutional Review Board was granted prior to data collection. Study participants were administered the 50-item IPIP representation of the Goldberg markers for the Big-Five factor structure questionnaire at the beginning of the third study term (See appendix).¹⁵ The Goldberg Big-Five Factor Model is a self-report questionnaire in which participants indicated their level of agreement to personality statements on a 5-point Likert Scale. This questionnaire included 10

items for each factor measured, including extraversion, agreeableness, conscientiousness, emotional stability, and imagination. Positively keyed extraversion items were given ascending scores as follows: 1 = Very Inaccurate, 2 = Moderately Inaccurate, 3 = Neither Inaccurate nor Accurate, 4 = Moderately Accurate, 5 = Very Accurate. Negatively keyed items were given descending scores in a similar fashion with Very Inaccurate scoring 5 and Very Accurate scoring 1. See Table 1 for all keyed items. Scores were summed for a total "extraversion score" with a minimum possible score of 10 describing highly introverted individuals and a highest possible score of 50 describing highly extraverted individuals. A score of 30 described an individual who is neither introverted nor extraverted, thus scores higher than 30 indicate extraverts while scores lower than 30 describe introverts. Extraversion scores were then matched to each student's mean practical examination score. Due to the research question dealing specifically with extraversion, the other personality indicators that are part of the tool used were not measured or compared.

Table 1. Keyed Extraversion Items

Positively Keyed Items	Negatively Keyed Items
I am the life of the party.	I don't talk a lot.
I feel comfortable around people.	I keep in the background.
I start conversations.	I have little to say.
I talk to a lot of different people at parties.	I don't like to draw attention to myself
I don't mind being the center of attention	I am quiet around strangers.

Data Analysis

Practical examination scores were compared with extraversion scores using a Spearman Rho analysis using SPSS version 25.

RESULTS

Sample Characteristics

Participants included 31 females and 29 males with a mean age of 26.7 ± 3.71 . Furthermore, the sample was composed of 32 first-year (PY1) students and 28 second-year (PY2) students. Results from the Mann-Whitney U test showed that the effects of both sex differences ($p=.12$) and graduate year ($p=.26$) on extraversion score were insignificant.

Table 2. Subjects

Item	First Year Students	Second Year Students	p value
Practical Exam	92.4% \pm 0.03	91.6% \pm 0.38	0.22
Extraversion	31.82 \pm 8.07	33.97 \pm 7.74	0.272

Practical Examination Scores

Mean practical examination scores for all study participants were calculated. Practical examinations are timed interactions with a mock patient. During these examinations, a student demonstrates the ability to effectively interact with a patient, make clinical decisions, and perform specific clinical skills (e.g. joint mobilization). These challenging examinations require both demonstration of didactic knowledge and, equally important, the ability to apply that knowledge in a patient treatment situation. During practical examinations some students are at ease and comfortable with patient interactions, while others visibly struggle to effectively communicate and demonstrate clinical skills. These observations and the desire to understand potential contributing factors led to the design of the current study. At the time of the study, first and second-year DPT students had completed practical examinations in anatomy, kinesiology, foundations of physical therapy practice, and upper extremity musculoskeletal system. These were all of the practical examinations offered in the first three terms of the program. Results from first and second-year students on the aforementioned practical examinations offered during the first three terms were used. Respective timing of data collection was the same for both student groups, with data from practical examinations from the first three terms of the curriculum collected. Surveys to measure personality type were given to both groups at the beginning of their first education year and scores from the same practical examinations were used. The practical examinations were graded by various faculty members, using a standardized rubric, teaching different courses using standardized rubrics and trained by the lead instructor for each course. The same faculty members graded practical examinations for each of the two student groups. Faculty were blinded to the personality tests prior to the practical examinations. Faculty members were not aware of the study until after the examinations were complete and then requests were made to share practical examination scores. Each of these practical examinations involved treating or interacting with a mock patient with a portion of the available points attributed to therapist/patient interaction. These points were attributed to the student's ability to establish a rapport with the patient and assist the patient to feel at ease. Mean practical examination scores

were $92.4\% \pm .03$ for the first-year students and $91.6\% \pm .38$ for the second-year students. Results from the independent t-test indicate that differences in practical examination scores between first-year and second-year students were not significant ($p=.22$). Additionally, no significant difference was found between sex and practical exam scores ($p=.81$). Total mean practical exam score was $93.00 \pm .39$, $p=.09$.

Extraversion Data

Mean extraversion score was 31.82 ± 8.07 (range: 15-47) for the class of 2018 and 33.97 ± 7.74 (range: 19-45) for the class of 2019. Total mean extraversion score was 32.97 ± 7.90 , $p=.27$. Significance was found with Spearman Rho correlation between extraversion and practical examination scores for all participants with $r_s = .582$ ($p = .027$).

Table 3. Correlation Analysis

Practical Examination	Extraversion	Spearman Rho	p value
93.00 \pm 2.44	32.97 \pm 0.90	$r_s = 0.582$	0.027

DISCUSSION

A significant positive correlation between extraversion and practical exam scores was found with this group of DPT students. As our research suggests, an individual may be more successful in certain aspects of a DPT program based on their level of extraversion. Reasons for these findings are interesting and warrant further investigation. Are more extraverted students at ease during practical examinations and able to think clearly to make appropriate clinical decisions, and therefore score higher than their more introverted classmates? Additional research is needed to examine the potential reasons for this correlation between extraversion and practical examination scores. Also, will more introverted students respond to training and resources focused on improving communication skills? Professors in physical therapy programs can potentially use information about students' personality types to recognize that students who are more introverted may have unique challenges in practical exam settings than their more extraverted classmates. With this awareness faculty members can provide training to help more introverted students to communicate effectively during practical examinations and patient interactions. More introverted students can benefit from instruction related to understanding non-verbal communication and establishing rapport and trust with patients. Research has shown that medical students improved their clinical empathy and communication skills with an interpersonal skill workshop¹⁶ and with an audiotape-led communication skill workshop.¹⁷ These findings suggest that physical therapy faculty can likely provide similar training to DPT students to potentially improve performance during practical examinations.

The present study has limitations including the small sample size and only the first three terms of the program were assessed. As the curriculum advances, the amount of patient interaction increases as students focus more on patient evaluation, therefore, analysis of all of the practical examination grades during an entire DPT curriculum would increase the data to be assessed (3A). Despite receiving training from the lead professor from a given course, and using the same standardized rubric, having more than one faculty member grading a practical examination introduces potential bias. It is important to note that faculty members grading practical examinations used in this study were unaware of the study at the time of the practical examination. While a positive correlation between extraversion and higher practical exam scores was found, there are several other factors that need to be considered. First, correlation coefficients are sensitive to sample size and future research should be conducted with larger number of participants. Extraversion level doesn't take into account each student's personal exam preparation. Also, prior clinical and life experience that students may have had was not considered. Prior to admission all students were required to have physical therapy observation hours and many students worked in the field as technicians prior to school giving them more opportunities to observe interactions between therapists and patients. There are also differences between practical examinations within various courses. While all examinations require some level of patient interaction, the amount of points allotted to patient interactions varies between courses.

Future research should incorporate larger sample sizes and a more comprehensive analysis of internal and external variables that may contribute to positive performance in practical examinations and patient interactions. Examination into potential reasons for the current study's findings would be helpful. If resources are provided to students to assist with communication skills, it would be of interest to assess whether practical examination scores improve. Holistic admissions criteria for DPT programs are currently being studied and information about personality traits may be considered useful in this process.

CONCLUSION

Practical examinations are an integral part of graduate level physical therapy curricula and successful completion of these examinations is a prerequisite for graduation. In this study we sought to determine if students with extraversion characteristics,

scored higher in practical examinations. Due to the interpersonal and communication skills that are needed to pass practical examinations we hypothesized that extraversion tendencies would predispose the students to higher scores. After taking a survey of students to evaluate their personality tendencies and comparing these to their practical exam scores, the data demonstrated there is a positive correlation between students with higher extraversion scores and higher practical exam scores. Thus, based on the present study it can be concluded that personality traits, in part, may contribute to a physical therapy student's success in practical examinations.

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Appendix: Goldberg's IPIP NEO Questionnaire

Questionnaire Instructions: For the following statements, rate how well each item describes your personality. Please be sure to read each statement, answer as accurately as possible, and clearly circle your response.

I often feel blue.

Very Inaccurate Moderately Inaccurate Neither Inaccurate nor Accurate Moderately Accurate Very Accurate

<i>I don't mind being the center of attention.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am the life of the party.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have difficulty understanding abstract ideas.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am quick to understand things.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I feel comfortable around people.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am exacting in my work.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I sympathize with others' feelings.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have a soft heart.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I follow a schedule.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I don't like to draw attention to myself.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am always prepared.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I get stressed out easily.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am easily disturbed.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I shirk my duties.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I change my mood a lot.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I pay attention to details.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have frequent mood swings.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I insult people.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate

<i>I have excellent ideas.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I feel little concern for others.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I don't talk a lot.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I worry about things.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I use difficult words.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have little to say.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I often forget to put things back in their proper place.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am relaxed most of the time.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I do not have a good imagination.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I make people feel at ease.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am interested in people.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have a vivid imagination.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I like order.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I start conversations.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I keep in the background.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I get upset easily.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I get chores done right away.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am not interested in other people's problems.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate

<i>I seldom feel blue.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I feel others' emotions.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am quiet around strangers.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I spend time reflecting on things.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I leave my belongings around.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I take time out for others.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I talk to a lot of different people at parties.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I have a rich vocabulary.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am full of ideas.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am not interested in abstract ideas.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I get irritated easily.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I make a mess of things.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate
<i>I am not really interested in others.</i>	Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate