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CLINICAL REASONING, CRITICAL THINKING DISPOSITION, AND SELF-REFLECTION: PREDICTORS OF ACADEMIC SUCCESS AND CLINICAL READINESS?

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By: Michael Obert, PT, MPT, OCS

Approved by:

Stephanie Kelly, PT, PhD, _____
Committee Chair

Karen Huhn, PT, PhD _____
Committee Member

Elizabeth Moore, PhD, _____
Committee Member

Accepted by:

Laura Santurri, PhD, MPH, CPH _____
Director, DHSc Program
University of Indianapolis

Stephanie Kelly, PT, PhD _____
Dean, College of Health Sciences
University of Indianapolis

Clinical Reasoning, Critical Thinking Disposition, and Self-Reflection: Predictors of Academic Success and Clinical Readiness?

Michael Obert

University of Indianapolis

Abstract

Identifying students who may struggle in a professional physical therapy (PT) program can inform admission decisions and direct development of strategies to help students be successful in the program. Many researchers have studied the relationship between various preadmission variables and success in a PT program. To date, the preadmission variables studied have accounted for 37% or less of the variance in predicting PT program success. The purpose of this study was to determine if preadmission variables and the following variables had an impact on PT student program success and clinical readiness: Health Science Reasoning Test – Numeracy (HSRT-N) scores, California Critical Thinking Disposition Inventory (CCTDI) scores, Self-Reflection and Insight Scale (SRIS) scores. This study also explored the relationship between the SRIS and HSRT-N and CCTDI. Forty-two DPT students were included in this prospective cohort study. The only statistically significant difference (p = .043) between PT students who experienced academic success and PT students who experienced academic difficulty was in their SRIS-Insight scores. Students who experienced academic success had higher mean SRIS-Insight scores than those who experienced academic difficulty. The SRIS and its subscales did have 17 statistically significant low to moderate correlations (r = .30-.67, p < .05) with HSRT-N and CCTDI scores and subscale scores. Results suggest that SRIS-Insight scores may be useful in identifying students at-risk for academic difficulty and SRIS scores may serve as a useful instrument in PT education.

Keywords: Health Science Reasoning Test-Numeracy, California Critical Thinking Disposition Inventory, Self-Reflection and Insight Scale, preadmission criteria, academic success, academic difficulty, clinical readiness, physical therapy education

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Michael Obert

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Clinical Reasoning, Critical Thinking Disposition, and Self-Reflection: Predictors of Academic Success and Clinical Readiness?

Professional physical therapy (PT) programs are faced with the important task of identifying students who have the potential to succeed in a demanding program. More importantly, once a cohort of students has matriculated into a program, PT faculty are charged with the task of ensuring their students are ready to enter into the clinical setting (Commission on Accreditation in Physical Therapy Education, 2014) and that at least 80% of the matriculated students graduate in a timely manner (CAPTE, 2016). There is a financial loss for schools when a student is not retained as well as a loss for the student who incurs a debt that does not result in a PT career. Clinical reasoning and critical thinking are important factors for safe and effective clinical practice and professional growth (Jensen, Gwyer, Shepard, & Hack, 2000; Resnik & Jensen, 2003). Critical thinking has been defined as "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (Facione, 1990, p. 3). Clinical reasoning is the application of the critical thinking process to a patient scenario that includes evidence of reflection (Jensen et al., 2000; Koharchik, Caputi, Robb, & Culleiton, 2015). For these reasons, it is of the utmost importance that critical thinking, clinical reasoning, and reflection are incorporated into professional PT programs.

Previous studies have focused on preadmission criteria as predictors of academic success in PT programs. Potential predictors have included measures of previous performance and aptitude such as undergraduate grade point average (GPA) and performance on the Graduate Record Examination (GRE). Other predictors evaluated are affective measures, learning styles,

interviews, undergraduate school selectivity, age, and ethnicity. To date, studies have only accounted for 37% or less of the variance to explain student academic success or difficulty in a PT program (Andrews, Johansson, Chinworth, & Akroyd, 2006; Jewell & Riddle, 2005; Ruscingo, Zipp, & Olson, 2010; Shiyko & Pappas, 2009; Templeton, Burcham, & Franck, 1994; Utzman, Riddle, & Jewell, 2007; Wheeler & Arena, 2009). While it may be impossible to explain 100% of the variance from a predictive equation, there are additional factors that have not been explored. A study attempting to predict performance on the National Physical Therapy Licensing Examination (NPTE) found that adding a measure of clinical reasoning improved the predictive ability of the model (Huhn & Parrott, 2017). It is possible that clinical reasoning, critical thinking disposition, and self-reflection could be some of the missing factors that could help programs predict who will be successful and prepared to enter the clinical setting.

Purpose of the Study

The purpose of the study was to explore the relationship between clinical reasoning skills, critical thinking disposition, and self-reflection in students prior to beginning coursework in a professional PT program and academic success and clinical readiness after the first year of the program. Preadmission criteria were also evaluated in order to compare the results of this study to the current body of evidence. The objectives of the study were:

1. To determine if there is a relationship between preadmission criteria and a) student academic standing in the first year of a program, and b) clinical readiness at the end of the first year of study.
2. To determine if there is a relationship between clinical reasoning, as measured with the Health Sciences Reasoning Test-Numeracy (HSRT-N), and a) student academic standing in the first year of a program, and b) clinical readiness at the end of the first year of study.

3. To determine if there is a relationship between willingness to think critically, as measured by the California Critical Thinking Disposition Inventory (CCTDI), and a) student academic standing in the first year of a program, and b) clinical readiness at the end of the first year of study.
4. To determine if there is a relationship between self-reflection, as measured by the Self-Reflection and Insight Scale (SRIS), and a) student academic standing in the first year of a program, and b) clinical readiness at the end of the first year of study.
5. To determine if there is a relationship between SRIS scores and scores on the HSRT-N and CCTDI.

Literature Review

CAPTE grants accreditation to PT programs that meet certain quality standards. Programs are expected to graduate at least 80% of matriculated students in a timely manner (CAPTE, 2016) and ensure clinical readiness of their students prior to clinical internships (CAPTE, 2014). Many studies have attempted to identify predictors of student academic success within a program to aid in the selection of students who have the most potential to succeed in a program. Others have sought the same information to identify students who may struggle within a program in order to provide an intervention to help them succeed. Clinical reasoning is a recurrent theme that CAPTE emphasizes should be incorporated into the PT curriculum (CAPTE, 2014), but to date there have been no studies to evaluate if clinical reasoning skills prior to admission have an impact on student success within a PT program. There is also little research on the impact of critical thinking disposition and self-reflection on academic performance in a PT program.

Preadmission Variables and Academic Success

In a total of 12 studies, researchers attempted to identify both academic and non-academic predictors of academic success and results ranged from being able to account for 16% (Templeton et al., 1994) to 37% (Thieman, Weddle, & Moore, 2003) of the variance. The commonly utilized cognitive variables included total undergraduate GPA (uGPA) or components of uGPA including science or prerequisite course GPA (Andrews et al., 2006; Day, 1986; Dockter, 2001; Fell, Mabey, Mohr, & Ingram, 2015; Huhn & Parrott, 2017; Jewell & Riddle, 2005; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Templeton et al., 1994; Thieman et al., 2003; Utzman et al., 2007; Wheeler & Arena, 2009). The total GRE scores (tGRE) and component scores including analytic (aGRE), verbal (vGRE), and quantitative (qGRE) were evaluated in many of the studies as potential predictors of student success in a PT program (Andrews et al., 2006; Day, 1986; Huhn & Parrott, 2017; Jewell & Riddle, 2005; Shiyko & Pappas, 2009; Thieman et al., 2003; Utzman et al., 2007; Wheeler & Arena, 2009). Besides the fact that the overall predictive variance was generally low, there are other challenges to applying the findings of these studies to current programs. The variances for the individual predictors were often either not reported, or in studies that assessed multiple PT programs, some of the variables were predictive in some programs but not others.

Non-cognitive variables were also evaluated with respect to their ability to predict student academic success in a DPT program. Age was a common factor for several studies (Andrews et al., 2006; Day, 1986; Dockter, 2001; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Thieman et al., 2003; Wheeler & Arena, 2009) although only three of the studies found that age had predictive value for academic success, and again the percentage of variance was low ranging from approximately eight to ten percent (Dockter, 2001; Shiyko & Pappas, 2009; Thieman et al., 2003). Race and gender were explored as potential predictors (Andrews et al., 2006; Day, 1986;

Shiyko & Pappas, 2009; Wheeler & Arena, 2009) with only one of these studies showing that white race was a positive predictor variable for program GPA (Day, 1986). Other studies explored further admission variables such as a written essay or verbal interview with all of them reporting that some combination of these variables added to a predictive model (Dockter, 2001; Shiyko & Pappas, 2009; Thieman et al., 2003). Two studies found that undergraduate school selectivity had an impact on predicting student success (Andrews et al., 2006; Wheeler & Arena, 2009).

While there were some studies that reported a high variance that was accounted for in predicting students' academic success in a PT program, there were some methodological flaws that may limit their use. The study that was able to predict 37% of the variance for the students' program GPA only had one out of 122 students from four cohorts who did not complete the program and the one student who did not complete the program withdrew in good standing (Thieman et al., 2003). The fact that all students either graduated or withdrew while in good standing, may limit this study's applicability to the current study, which aimed to identify those students who may struggle in the first year. The next highest variance accounted for that was reported in these studies was 33%, but this study excluded 13 students who did not graduate (Fell et al., 2015), which also limits its applicability to the current study. Of the studies that reported attrition and included students who had experienced academic difficulty, the highest variance accounted for was 24% that included a combination of vGRE, qGRE, and uGPA added to the predictive model (Utzman et al., 2007). This study, however, included students from a combination of master's programs, transitional DPT programs, and DPT programs. The researchers reported there was high variability in using their equation for each of the 20 programs included in the study (Utzman et al., 2007).

The academic variables, including uGPA (Andrews et al., 2006; Day, 1986; Dockter, 2001; Fell et al., 2015; Huhn & Parrott, 2017; Jewell & Riddle, 2005; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Templeton et al., 1994; Thieman et al., 2003; Utzman et al., 2007; Wheeler & Arena, 2009), tGRE (Shiyko & Pappas, 2009; Thieman et al., 2003), vGRE (Jewell & Riddle, 2005; Shiyko & Pappas, 2009; Utzman et al., 2007), and qGRE (Jewell & Riddle, 2005; Shiyko & Pappas, 2009; Utzman et al., 2007; Wheeler & Arena, 2009) were the most frequently reported significant predictors of success in a professional PT program ($p < .05$). However, success was defined differently in many of these studies. The most frequently reported non-academic variables that were significant predictors of academic success were undergraduate school selectivity (Andrews et al., 2006; Wheeler & Arena, 2009), age, and admission interviews and essays (Dockter, 2001; Shiyko & Pappas, 2009; Thieman et al., 2003).

Academic Success and Difficulty

Academic success and difficulty were defined differently in many of these studies, which provides a challenge for utilizing their results. A few studies aimed to predict the final program GPA (Day, 1986; Fell et al., 2015; Thieman et al., 2003) while others looked at predicting first-year GPA (Dockter, 2001; Ruscingo et al., 2010; Shiyko & Pappas, 2009). While the equations from these studies could be useful, the authors did not identify if there was a difference between students who experienced academic difficulty and students who did not. One study demonstrated that using a combination of uGPA and undergraduate school selectivity was able to predict attrition, although the variance accounted for was not stated (Andrews et al., 2006). Three other studies defined academic difficulty similar to the current study that included students who went on probation or were dismissed from the program for academic reasons. These studies reported that a combination of school selectivity (Wheeler & Arena, 2009), component GRE scores, and

uGPA were able to predict students with academic difficulty (Jewell & Riddle, 2005; Utzman et al., 2007; Wheeler & Arena, 2009).

Type of Program

Another challenge with interpreting and implementing results of these studies is that there were many different types of programs included. One study included students from a two-year bachelors program (Templeton et al., 1994), five of the studies included students from master's programs only (Andrews et al., 2006; Day, 1986; Dockter, 2001; Jewell & Riddle, 2005; Thieman et al., 2003), five studies included DPT programs only (Fell et al., 2015; Huhn & Parrott, 2017; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Wheeler & Arena, 2009), and one study included students from master's, transitional DPT, and DPT programs (Utzman et al., 2007). The current standard in PT education is a DPT program, and even across DPT programs, there is some variance where some programs are a traditional graduate program and others are direct-entry programs or 3+3 programs. While many of the master's programs that were included in this review were graduate programs, the depth and rigor of DPT programs have increased compared to master's programs, so their results may not be generalizable to students in a current DPT program.

Clinical Reasoning

One missing factor that has not often been used to predict student academic performance is clinical reasoning. It is well accepted in healthcare that clinical reasoning is an important factor for becoming a clinician. Commission on Accreditation in Physical Therapy Education has emphasized the importance of incorporating clinical reasoning into PT education (CAPTE, 2014). Clinical reasoning is one component on the Clinical Performance Instrument (American Physical Therapy Association, 2006) which is used to evaluate student performance in the

clinical setting. Students are not expected to enter a PT program with good clinical reasoning skills, as clinical reasoning is something that is taught in PT programs and is expected to improve over time. Since clinical reasoning is the application of the critical thinking process to patient scenarios (Jensen et al., 2000; Koharchik et al., 2015), it may be useful to assess students critical thinking skills with a health care focus. The HSRT-N is a critical thinking skills test with a health care focus, and could potentially provide insight into the critical thinking skills of the students at the beginning of a program. Low scores on the HSRT-N could potentially lead to challenges with their development of clinical reasoning skills while in the program.

Jensen, Gwyer, Shepard, and Hack (2000) identified clinical reasoning skills as one of the components of expert practice in PT. Reflective practice is one of the key components of clinical reasoning (Jensen et al., 2000). Given the importance of clinical reasoning skills for the development and success of PT students and PTs, it may be advantageous to evaluate clinical reasoning skills, as well as the key components of critical thinking, critical thinking disposition and self-reflection as potential predictors of success in PT education. Students may have good critical thinking skills, but if their critical thinking disposition is such that they are not readily willing to engage in the critical thinking process, it may be challenging to develop their critical thinking skills, and thus their clinical reasoning skills. Additionally, those who are not willing to engage in components of clinical reasoning, such as critical thinking and self-reflection, may have difficulty with improving their clinical reasoning skills. Therefore, it is also important to address students' disposition toward critical thinking.

Clinical reasoning skills have been shown to evolve over time for students in a DPT program (Gilliland, 2014, 2017; Huhn, Black, Jensen, & Deutsch, 2013). In a qualitative study, first-year students used more simple strategies which involved faulty reasoning patterns

compared to third-year students who used more sophisticated strategies (Gilliland, 2014). Students also tended to focus more on surface concepts and anatomy early in the development of their clinical reasoning. As they progressed through a program, their clinical reasoning process incorporated more information from the medical diagnosis and biomechanical factors, but they still did not incorporate the patient's life context into their decision-making (Gilliland, 2017). While a focus on movement and biomechanics is an additional key factor for expert practice (Jensen et al., 2000), students were missing the reflective part of the clinical reasoning process. In another study, clinical reasoning skills as measured by the Health Sciences Reasoning Test (HSRT) improved from the beginning of a DPT program to the end of the didactic portion of a program. However, there were no significant changes noted in the HSRT scores during the clinical internships at the end of the curriculum (Huhn et al., 2013).

Clinical reasoning skills were assessed in only one of the studies predicting academic success. The aim of this particular study was to evaluate the relationships between clinical reasoning skills as measured by the HSRT, cognitive admission variables, and success on the National Physical Therapy Licensing Examination (NPTE). While it was not the primary focus of the study, the authors reported a moderate correlation between the HSRT scores and first-year GPA ($r = .33$, $p < .001$) and that first-year GPA had the strongest relationship with NPTE pass rates ($r = .60$, $p < .001$). The HSRT also had a strong relationship with the NPTE ($r = .43$, $p < .001$) and the addition of the HSRT to a predictive model improved the strength of the model (AIC $\chi^2 = 10.7$; $p = .001$) (Huhn & Parrott, 2017). The HSRT has also been deemed to have construct validity for use with PT students as scores were able to discriminate between novice and expert clinicians, particularly the deductive ($p = .01$) and analysis ($p < .001$) subscales (Huhn, Black, Jensen, & Deutsch, 2011). Results of these studies indicate that the HSRT may

have validity for the current study, and the fact that first-year GPA had a strong correlation with NPTE pass rates indicates the importance of success in the first year. For the purpose of the current study, the developers of the HSRT recommended the use of the HSRT-N (Numeracy), which is a newer version of the HSRT and can be correlated to the HSRT results in the literature (D. August, personal communication, March 21, 2018).

Self-Reflection

Since self-reflection is considered a vital component of clinical reasoning and expert practice (Jensen et al., 2000), it would be valuable to explore self-reflection as a potential predictor of academic performance. Students' clinical reasoning skills and self-reflection improved over time in a DPT program in one longitudinal mixed methods study (Furze et al., 2015). Beginners used more compartmentalized thinking and did not focus on the whole patient, whereas intermediates began to implement the context of the patient on decision making and had notable improvements in self-reflection. Finally, entry-level students had a much more encompassing approach that included the patient's context into their clinical reasoning process (Furze et al., 2015). Roche and Coote (2008) reported that in the beginning stages of a PT student's development, reflection was more performance-based. Toward the end of the program, students reported that reflection had a positive effect on clinical practice. Reflection allowed them to have a more open mind with treatment choices, helped them improve their pattern recognition, and provided justification for their treatment choices (Roche & Coote, 2008). Finally, one study utilized the Self-Reflection and Insight Scale (SRIS) that showed improvements in scores following a critical thinking course within a DPT program (Huhn, 2017). There is also a connection between self-reflection and learning, where self-reflection and learning have mediated the effects of anxiety in nursing students (Pai, Ko, Eng, & Yen, 2017). If

students struggle in their ability to self-reflect, it is possible they could struggle through a DPT program that includes a significant level of learning and also emphasizes the clinical reasoning process. Early identification of these students could help faculty implement measures to improve their self-reflection and clinical reasoning skills.

Unfortunately, there is a lack of empirical evidence aimed at measuring reflection in a PT setting. The majority of studies identified in this literature review used qualitative methods to assess clinical reasoning, while Furze et al. (2015) developed the Clinical Reasoning Reflection Questionnaire (CRRQ) for use in their study; however, it has not been validated. While the SRIS has only been utilized with PT students in one study (Huhn, 2017), it can be used to measure cognitive flexibility, reflection, and self-regulation and has been used in multiple settings including with nursing students, where self-reflection and insight had a positive effect on critical thinking ($p < .001$) (S. Y. Chen, Chang, & Pai, 2018). Positive scores on the SRIS have also demonstrated a positive correlation with competence in Taiwanese nursing students (Eng & Pai, 2015). While there are limited standardized tools to measure self-reflection in PT education, the SRIS has demonstrated adequate metrics for use in healthcare education, and was used for this study as a measure of self-reflection.

Critical Thinking Disposition

While it has been shown that clinical reasoning and self-reflection develop over time, it is also important to understand the student's attitude towards thinking and willingness to change a thought process over time in order to be successful in a PT program. The CCTDI, which classifies scores as strong negative, negative, inconsistent or ambivalent, positive, or strong positive (Insight Assessment, 2018a), has been used for this particular purpose with PT students. One study reported that PT students' scores on the CCTDI were low compared to the normative

values for health sciences majors, although this particular study assessed bachelor's-level PT students (Bartlett & Cox, 2000). Another study sought to explore the relationship between the CCTDI, the California Critical Thinking Skills Test (CCTST), and attrition in PT students. The authors only reported descriptive statistics of the CCTDI in this study that were inconsistent. The students' CCTST scores were low as a whole (20^{th} percentile), and this may have partially explained why there was no significant correlation with CCTST scores and attrition (Domenech & Watkins, 2015). On the contrary, other studies have demonstrated that CCTST and CCTDI scores significantly improved ($p < .05$) over time, particularly the truth-seeking and self-confidence subscales of the CCTDI (Bartlett & Cox, 2002; Wessel & Williams, 2004). These studies have demonstrated that PT students have the potential to score low on their critical thinking disposition, but that it can improve over time. The CCTDI was utilized for the current study to explore the relationship between critical thinking disposition and student academic success in the first year of a DPT program. It is important to assess disposition towards critical thinking because one can have good critical thinking skills, but if they are not willing to use those skills, they may not be successful in a program that emphasizes critical thinking and clinical reasoning.

While there have been many studies that have aimed to predict student success in a PT program, both for admissions and retention purposes, there is a lack of research evaluating the impact of clinical reasoning, self-reflection, and critical thinking disposition on student academic performance. The aim of the current study was to explore the relationship of preadmission variables, clinical reasoning skills as measured by the HSRT-N, self-reflection as measured by the SRIS, and critical thinking disposition as measured by the CCTDI with success in the first year of a DPT program and clinical readiness at the end of the first year. Findings of this study

may help inform admissions decisions in addition to identifying students who may benefit from early intervention to help them succeed in a DPT program.

Method

Study Design

This prospective cohort study explored the relationship between preadmission variables, HSRT-N scores, CCTDI scores, and SRIS scores collected prior to beginning a DPT program to student academic success in the first year of a program and clinical readiness at the end of the first year of study. The study took place at Mount St. Joseph University (MSJ) within the Department of Physical Therapy between June, 2018 and May, 2019. Prior to participant recruitment, the study was approved by the Human Research Protections Program (HRPP) at the University of Indianapolis who entered into a reliance agreement with the institutional review board (IRB) at MSJ.

First year curriculum and Hallmark Practical I. The first-year curriculum in the MSJ DPT program consists of foundational knowledge courses with a progression to foundational clinical courses. The first two semesters in the program include gross anatomy, exercise physiology, neuroscience, biomechanics, and kinesiology. Students are also introduced to the research series and professional socialization in these semesters. The third and final semester continues the professional socialization series along with introduction to professional issues. The core of the third semester is the foundational clinical courses including basic examination and evaluation, basic patient care skills, therapeutic exercise, and modalities. It is in the third semester where the students begin to apply their foundational knowledge in patient-based scenarios and learn the basic skills required by physical therapists.

At the end of the third semester, students participate in Hallmark Practical I (HMP I), which is a summative year-end practical in which the students perform an examination, evaluation, and treatment of a simulated patient. Students are graded on each component of the simulated case and separate rubrics are utilized for each of the four clinical courses based on the appropriate components of the initial examination and treatment. Student performance is also evaluated on a separate rubric that is used to determine clinical readiness. The rubric was designed by faculty, although it does not have established reliability and validity. Students are graded in four categories including clinical reasoning, professionalism, communication, and safety. For each category student performance is rated as either unsatisfactory, emerging, or proficient. Students must achieve a minimum of emerging in each of the four categories to successfully pass HMP I. Students who successfully complete the first year and receive a passing score on HMP I are deemed clinically ready and be able to begin their integrated clinical experiences the following month.

Operationalization of variables. For the current study, participants were placed in the academic difficulty group if they experienced one of the following: academic probation, warning letter, or academic dismissal. Students were placed in the academic success group if they did not experience academic difficulty as defined here. Academic probation is defined as having a cumulative GPA less than 3.0 on a 4.0 scale. A warning letter is sent to any students who have earned less than a 3.0 in any given semester, but whose cumulative GPA is still at or above a 3.0. Academic dismissal is defined as any student who is not able to continue in the DPT program either for failure of a course or consecutive semesters with a cumulative GPA less than 3.0. All participants who did not fall into the academic difficulty group were considered as having achieved academic success in the first year of the program. Clinical readiness was determined

using HMP I scores. Students who obtained a level of emerging or proficient were considered clinically ready.

The critical thinking component of clinical reasoning was measured using the HSRT-N, which gives an overall score as well as scores in seven subscales: Analysis, Interpretation, Inference, Evaluation, Explanation, Deduction, and Induction. Analysis measures the ability to identify patterns and assumptions when making decisions. Interpretation is the ability to determine or assign meaning to a given situation. Inference is the ability to draw conclusions from a given set of information. Evaluation is the ability to assess the quality and credibility of information and their sources. Explanation is the ability to provide a rationale for decisions. Deduction is the ability to determine what to believe or do in situations that are clearly defined. Induction is the ability to determine the most likely outcome given a situation that may not be clearly defined (Insight Assessment, 2018b).

Critical thinking disposition was measured using the CCTDI, which provides results as an Overall score as well as scores in seven subscales: Truth-seeking, Open-mindedness, Analyticity, Systematicity, Confidence in reasoning, Inquisitiveness, Maturity of judgment. Truth-seeking is the desire to gain the best understanding of every situation even when the evidence conflicts with personal beliefs. Open-mindedness is the tendency to consider and tolerate the beliefs or opinions of others that differ from one's own beliefs. Analyticity is the tendency to predict what will happen next based on a certain situation. Systematicity is making a habit of approaching situations in a very structured and systematic way. Confidence in reasoning is the tendency to trust one's own thought process and problem-solving skills. Inquisitiveness is the desire to learn more. Maturity of judgment is the tendency to make decisions in a timely manner even when multiple correct solutions may apply (Insight Assessment, 2018a).

Self-reflection was measured using the SRIS, and scores are reported using an overall score, self-reflection score, and insight score. Self-reflection is "the inspection and evaluation of one's thoughts, feelings and behavior" (Grant, Franklin, & Langford, 2002, p. 821) and insight is "the clarity of understanding of one's thoughts, feelings and behavior" (Grant et al., 2002, p. 821).

Instrumentation

Health Sciences Reasoning Test with Numeracy. The HSRT-N was developed from an earlier tool, the HSRT which is a test designed to measure clinical thinking skills and the decision-making processes. The test can be taken electronically or on a paper form and can be administered in a 50-minute time frame. Insight Assessment who is the proprietor of the test scored the tests and provided results in the form of an overall score and five subscores: Analysis, Inference, Evaluation, Induction, and Deduction (Insight Assessment, 2018b). The HSRT has demonstrated the ability to track changes in clinical reasoning skills over time in a DPT program (Huhn et al., 2013) and has also shown discriminative ability between novices and experts (Huhn et al., 2011), ability to predict NPTE success, and aid in admissions decisions (Huhn & Parrott, 2017).

A previous study demonstrated there was a difference in scores between undergraduate and graduate students on the HSRT, where the mean in undergraduate programs was 18.3 and the mean in graduate programs was 22.5 (Huhn & Parrott, 2017). In a validation study, the mean score for novice physical therapists was 22.49 (3.2) and the mean score for experts was 24.06 (3.92). The total score in addition to the Deduction and Analysis subscale scores demonstrated discriminative ability between novices and experts at a $p < .01$ level. Reliability for the five

subscales have also been reported and are as follows: Induction (r = .76), Deduction (r = .71), Inference (r = .52), Analysis (r = .54), and Evaluation (r = .77) (Huhn et al., 2011).

Developers of the HSRT recommended the use of a newer version of this test, the HSRT-N (numeracy). The HSRT-N is a 38-question test that is taken electronically and scored on a 100-point scale. There are currently no published studies using the HSRT-N in physical therapist education programs, however, the scores on the HSRT-N can be directly correlated with scores from the HSRT with "the correlation of scores for both versions approaching 1.00" (D. August, personal communication, March 21, 2018). Percentiles are also comparable across the two versions, and the HSRT-N adds three additional scales, Numeracy, Explanation, and Interpretation (D. August, personal communication, March 21, 2018). Based on the recommendation of the developers, the HSRT-N was used for the study, and permission was granted by Insight Assessment to use the HSRT-N for the study.

California Critical Thinking Disposition Inventory. The CCTDI is a questionnaire designed to measure one's disposition and willingness to engage in critical thinking. The test can be taken in either an electronic or paper format and is estimated to take less than 30 minutes to complete. The test has been calibrated for various professions, adults, and students in grades ten and above. The CCTDI is another proprietary test through Insight Assessment who performed the scoring of the tests. The CCTDI measures seven scales: truth-seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgment (Insight Assessment, 2018a).

A few studies have used the CCTDI in PT education. The alpha reliability of the overall CCTDI has been reported as .91 with the Cronbach's alpha for the seven subscales ranging from .71 to .80. The subscales have also been correlated with the psychological constructs of

"openness to experience" and "ego resiliency" which helps establish validity of the instrument. (Domenech & Watkins, 2015). Two studies have reported lower scores in the self-confidence and truth-seeking subscales in PT students (Bartlett & Cox, 2000; Domenech & Watkins, 2015) while a third reported statistically significant changes in the total scores and all subscales over one year, with the greatest changes occurring in the same subscales over the didactic portion of the program (Bartlett & Cox, 2002). One final study which evaluated CCTDI scores with PT students demonstrated that overall change scores at two different time points were not statistically significant, but there were statistically significant changes in the subscales of truth-seeking, self-confidence, and systematicity (Wessel & Williams, 2004). Finally, one study evaluated PT students change in CCTDI scores from before taking a clinical reasoning course to after completing a clinical reasoning course. The author reported statistically significant ($p < .05$) improvements in CCTDI total scores, as well as the subscales of truth-seeking, systematicity, confidence in reasoning, and inquisitiveness (Huhn, 2017). While there is a paucity of research that has utilized the CCTDI with PT students, the limited results have demonstrated usefulness and the ability to measure change over time with the population of interest (Bartlett & Cox, 2000, 2002; Domenech & Watkins, 2015; Huhn & Parrott, 2017; Wessel & Williams, 2004). Permission was granted by Insight Assessment to use the CCTDI for the study.

Self-Reflection and Insight Scale. The SRIS (see Appendix A) is a 20-question inventory with users responding on a six-point Likert scale from "disagree strongly" to "agree strongly." The SRIS includes two subscales: self-reflection and insight. This instrument has demonstrated reliability with test-retest correlation being $r = .77$ for self-reflection and $r = .78$ for insight. The SRIS has also demonstrated good internal consistency with both subscales with a Cronbach's alpha of .91 for self-reflection and .87 for insight (Grant et al., 2002). One study

utilized the SRIS to evaluate change in PT students' self-reflection and insight before and after participating in a course in critical reasoning. Results showed a statistically significant increase (p = .001) in total scores from pre-course to the completion of the course (Huhn, 2017). While the SRIS has not been frequently utilized with PT education to date, it has been used with adequate metrics with nursing students (S. Y. Chen et al., 2018; Shu Yueh Chen, Lai, Chang, Hsu, & Pai, 2016; Eng & Pai, 2015), across cultures with various versions in different languages (Aşkun & Çetin, 2017; Shu Yueh Chen et al., 2016), and in the field of psychology where results of the SRIS have served as a significant predictor of psychological well-being (Harrington & Loffredo, 2010). With these factors considered, the SRIS was utilized in the current study as a potential predictor of success. Permission was granted by the developer of the SRIS to use this assessment for the study (A. Grant, email communication, February 10, 2018).

Participants

A convenience sample was recruited from the incoming MSJ student cohort in June, 2018. The inclusion criteria for this study were being a first-year DPT student in the MSJ program and not having prior experience in a DPT program. The exclusion criteria were not being a first-year student in the MSJ DPT program or having taken prior classes in any DPT program. Forty-four potential participants met the inclusion criteria of being a first-year DPT student in the MSJ program and not having prior experience in a DPT program. No students were excluded from potential participation due to the exclusion criteria.

Data

Data were collected from three sources: the registrar's office at MSJ, an online survey taken by study participants at the beginning of the DPT program, and from the DPT program at the end of the academic year. Data collected from the registrar's office included GPA at the end

of the first year or at the time of dismissal from the program. This data was sent to the research assistant who compiled and de-identified data utilizing pre-assigned code numbers into a spreadsheet prior to sending to the principle investigator. Preadmission and demographic information were obtained from the DPT program through the same research assistant. The research assistant compiled and de-identified the data utilizing pre-assigned code numbers prior to sending the data to the principle investigator.

Data collected through the online survey included SRIS scores, HSRT-N scores, and CCTDI scores. The online survey was taken through two different platforms. The SRIS was taken through Qualtrics while the HSRT-N and the CCTDI were taken through the platform used by Insight Assessment. After grades were entered at the conclusion of the first year, data was downloaded from Qualtrics by the primary investigator into an Excel file. Data were also collected and compiled by Insight Assessment at that time and emailed to the primary researcher. Data from the three assessments were in the form of the pre-assigned code numbers in order to maintain confidentiality of the participants. Student data from the various sources was matched by the primary investigator through the use of the unique study identification number and organized into an Excel file.

Procedures

Assignment of study identification number. A research assistant in the DPT program randomly assigned a four-digit code to every student in the first year DPT cohort and maintained this information in a spreadsheet on a secure flash drive under lock and key. At no time did the primary investigator have access to this file. The research assistant gave students their code during the meeting to introduce the students to the research study. They were told they would need to use this code if they agreed to participate in the study. This method of code assignment

allowed the participants to maintain confidentiality and the primary investigator to remain blinded to the participants throughout the study. The research assistant would also be able to retrieve each participant's code in case one of the participants forgot his or her code.

Recruitment. Potential participants were informed that this study was approved by the HRPP and IRB and were recruited at MSJ during their first week of orientation to the DPT program. A typed letter describing the purpose of the study and rationale for recruitment was distributed to each of the students (see Appendix A). A research assistant who was not involved in the study distributed the letters to minimize coercion. The same person also gave a verbal explanation of the purpose of the study and answered questions regarding the process to the best of their ability. Potential participants were informed that if they chose to participate, their student records including preadmission data and grades within the program would be accessed, although this information would be de-identified to ensure confidentiality. Potential participants were also instructed that their choice to either participate or not participate in the study would have no bearing, positive or negative, on their placement or success in the program. Potential participants were informed that they could withdraw from the study at any time with no repercussions to them. Potential risks and benefits of the study were also included in the letter. Potential risks of participation in the study were anticipated to be minimal and could include emotional distress associated with taking the tests and questionnaires and receiving their results on these forms. Potential benefits of participation were also minimal and could include possible insights into the students' own clinical reasoning skills, critical thinking disposition, and self-reflection. Potential participants were assured that their personal identifying information would remain anonymous. Consenting participants were given the opportunity to meet with the primary investigator prior to participation in the study and address any questions or concerns that would not impact the

validity of the study. Students were required to complete several different tasks during the first few weeks as part of orientation. Students were told they would be given time during their orientation to participate if they wished and it would not require any time outside their regular class time.

Informed consent. An informed consent document was placed at the beginning of the online survey taken through Qualtrics. Potential participants were required to select either "yes" or "no" indicating whether or not they gave consent to participate in the study. Selecting "yes" indicated consent to participate in the study, and the data from the proceeding tests would be collected. Individuals selecting "no" would be taken to the end of the survey and no further information would be collected. When the survey moved out of the Qualtrics platform to the Insight Assessment platform, prior to starting the next part of the survey participants were required to respond "yes" or "no" indicating their continued consent to participate in the study. Selecting "yes" to each of these questions and completing all of the assessments indicated informed consent to participate in the study. Potential participants were informed that this study was approved by the HRPP and IRB.

Data collection. All first year DPT students were given time during orientation in the first few weeks of the program to participate in the study by completing the online survey using a computer in the computer lab on campus. A specific time was set up within the first few weeks of the program when students were required to gather in the computer labs. During this preset time, students were instructed that they could participate in the study and complete the surveys, or they could use the time to study, do other coursework, or complete their additional orientation tasks. Having all students in the same room helped ensure confidentiality of those who chose to participate and those who chose not to participate in the study. The link to the online survey was

posted for all students to see. The link navigated them to the Qualtrics survey. To proceed to the survey students had to consent to being in the study by clicking "yes" on the informed consent form. Those who proceeded in the survey first took the SRIS. At the end of the SRIS instrument, there was a link to the second part of the study. This link took participants to the Insight Assessment site where participants again had to consent to be in the study to move forward in the surveys. Participants who marked "yes" were asked to complete the HSRT-N and CCTDI.

Consenting participants completed the three instruments consecutively with the option of a short break in between tests. The research assistant was available via phone or email to help troubleshoot any technical problems with completing the instruments. Insight Assessment was also available to provide technical support for the HSRT-N and CCTDI via phone if needed during testing. Participants took the SRIS first, followed by the CCTDI, and finally the HSRT-N. The SRIS and CCTDI are questionnaires with a Likert scale system and were deemed not to provide an overt amount of mental fatigue. Insight Assessment recommends having participants take the CCTDI prior to the HSRT-N for this reason, and have not reported any problems with testing fatigue (C. Smitt, personal communication, April 16, 2018).

Following completion of the online survey, the primary researcher provided a list of the study identification numbers of study participants to the research assistant. Data was not analyzed at that time, only a list of study identification numbers for those completing the three instruments was provided. The research assistant used the codes to collect the preadmission data. They entered the data into an Excel spreadsheet and only used the assigned student identification number, no student identifiers were put into the file. Upon completion, the research assistant put the Excel file onto a secure, encrypted flash drive and kept it under lock and key. At the conclusion of the first year, the research assistant de-identified and coded data regarding first

year GPA, academic status, and HMP I performance. The de-identified data was placed in an Excel file and given to the primary researcher via the secure, encrypted flash drive. The primary researcher was responsible for combining data from all sources and matching the data using the assigned study identification numbers. Once all data were collected, it was exported to a statistical software program for analysis.

Health Sciences Reasoning Test and California Critical Thinking Disposition Inventory. The HSRT-N and CCTDI can both be taken via a browser-based or app format. Participants had access to an in-app tutorial prior to taking these tests to help with navigating and completing the HSRT-N and the CCTDI. All scoring for the HSRT-N and CCTDI was completed by Insight Assessment. Any participants requiring accommodations to complete the tests were to notify the research assistant, and additional time would be allotted for those participants to complete the tests. Insight Assessment sent the coded scores from the HSRT-N and CCTDI to the primary investigator. Again, data was sent only using study identification codes and no personal identifying information was listed.

Completing the three instruments previously described satisfied the requirements of participation. Thereafter, students continued through their first year in the program with no other requirements for participation in the study. At the conclusion of the first year, all enrolled students in this cohort who were not dismissed or did not withdraw participated in a summative year-end practical, HMP I. Student academic performance in the first year and their performance on HMP I are both used within the MSJ DPT program to determine clinical readiness for participation in clinical internships following the first year.

Statistical Analysis

All statistical tests were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics were conducted on the entire sample. Nominal data are presented as frequencies and percentages, ordinal data as medians and interquartile ranges, while interval and ratio data are reported as means and standard deviations or medians and interquartile ranges, dependent on whether the data were normally distributed. Nominal data were compared using Fisher's exact tests, ordinal data were compared using Mann-Whitney *U* tests, normally distributed interval and ratio data were compared using independent *t* tests while non-normally distributed interval and ratio data were compared using Mann-Whitney *U* tests. Correlations were conducted using Pearson tests for normally distributed data and Spearman rho tests for ordinal and non-normally distributed data. Correlation coefficients were interpreted as follows: a correlation of 0-.30 were considered very low to no correlation, .30-.50 were considered low, .50-.70 were considered moderate, .70-.90 were considered high and .90-1.00 were considered very high (Hinkle, Wiersma, and Jurs, 1979).

The Shapiro-Wilk test was used to assess the normality of the data and the Levene's test was used to determine if there was homogeneity of variance. Data were considered normally distributed if the Shapiro-Wilk test statistic did not differ from a normal distribution at a significance level of .05. All tests were two-tailed and a significance level of less than .05 was considered statistically significant.

Results

Demographics

Forty-four students participated in the study. Two participants began taking the assessments, but did not complete all of them; therefore, they were excluded from data analysis. Of the remaining 42 students, the majority were female (n = 27, 64.3%) and Caucasian (n = 38,

90.5%). The median age was 23 years (25^{th} percentile 22, 75^{th} percentile 24). Demographic details can be found in Table 1. Thirty-five (83.3%) students were in the academic success group while 7 (16.7%) students were in the academic difficulty group.

There were no statistically significant differences ($p > .05$) in student demographics between academic standing groups (success and difficulty). Sample descriptive statistics for outcome data: preadmission criteria, HSRT-N scores, CCTDI scores, and SRIS scores can be found in Tables 1-4, respectively. Four of the 42 students who participated in the study did not complete the first year of the program; three were dismissed due to academic difficulty, and one withdrew voluntarily from the program while in good academic standing. Data from the student who withdrew voluntarily from the program was included in the study. The remaining 38 students who completed the first year of the program, passed HMP I and were deemed "clinically ready," and thus only correlation analysis was performed for clinical readiness.

Objective 1: Preadmission Criteria, Academic Standing and Clinical Readiness

There were no significant differences between groups in academic standing in any of the preadmission criteria including uGPA, pre-requisite GPA, tGRE, vGRE, qGRE, aGRE and interview scores, thus the null hypothesis is accepted. See Table 1 for descriptive and comparative statistics.

Statistically significant, but low positive correlations were found between HMP I professionalism scores and qGRE scores ($r = .35$, $p = .031$), and HMP I communication scores and interview scores ($r = .41$, $p = .011$). All other correlations were insignificant.

Objectives 2: Health Sciences Reasoning Test with Numeracy, Academic Standing and Clinical Readiness

There were no significant differences between groups in academic standing in any of the HSRT-N scores or CCTDI scores. See Table 2 for descriptive and comparative statistics.

Interpretation scores had a moderate positive correlation with HMP I clinical reasoning scores (r = .51, p = .001), and low positive correlations with HMP I professionalism scores (r = .34, p = .035) and HMP I safety scores (r = .34, p = .039). There was also a low positive correlation between Inference scores and HMP I safety scores (r = .44, p = .006), and Evaluation scores and safety scores (r = .43, p = .007), and Numeracy and HMP I clinical reasoning scores (r = .40, p = .013). All other correlations between HSRT-N scores and HMP I scores were insignificant.

Objective 3: California Critical Thinking Disposition Inventory, Academic Standing and Clinical Readiness

There were no significant differences between groups in academic standing in any of the CCTDI scores. See Table 3 for descriptive and comparative statistics. All correlations between CCTDI scores and HMP I scores were insignificant.

Objective 4: Self-Reflection and Insight Scale, Academic Standing and Clinical Readiness

Self-reflection and Insight and Academic Standing scores including total score, self-reflection, and insight scores were analyzed. Three extreme outliers were identified in the SRIS-I scores. These scores were analyzed for data input accuracy, which all were deemed to be entered correctly. Individual responses on the SRIS were then analyzed to determine if the participants had consistent answers. Two of the three demonstrated consistent answers; therefore, their data were included in the analysis. The third participant had inconsistent answers to similar questions. Since the validity of the participant's scores was uncertain, the data were analyzed both including and excluding the participant's data to avoid researcher bias.

When including all data points, there were no significant differences between groups in academic standing for the SRIS total, SRIS-SR, or SRIS-I scores. With the extreme outlier excluded, the non-significant differences remained for SRIS total and SRIS-SR. However, there was a statistically significant difference between groups in academic standing for the SRIS-I scores, with the academic success group having a higher mean score. See Table 4 for descriptive and comparative statistics for outcomes with all data points and the one significant difference with the outlier removed. All correlations between SRIS scores and HMP I scores were insignificant.

Objective 5: Correlation between Assessments

Health Sciences Reasoning Test with Numeracy and Self-Reflection and Insight Scale. There were three correlations between HSRT-N subscales and SRIS subscales that had a low correlation, all others were negligible. The low correlations were between HSRT-N subscale evaluation and SRIS total, HRST-N subscale evaluation and SRIS-SR, and HSRT-N subscale induction and SRIS-I. See Table 5 for all correlations between HSRT-N and SRIS scores.

California Critical Thinking Disposition Inventory and Self-Reflection and Insight Scale. There were fourteen correlations that were at a least low correlation, including seven moderate correlations, between the CCTDI scores and SRIS scores. The truth-seeking and maturity of judgment subscales were the only CCTDI scores that did not have at least a low correlation with any of the SRIS scores. See Table 6 for all correlations between CCTDI scores and SRIS scores.

Discussion

The current study found no significant predictors of first-year GPA and only one statistically significant difference in Insight scores (p = .043) between students who were

successful and students who demonstrated difficulty in the first year of a DPT program. Previous studies have reported that GRE scores or components of GRE scores (Day, 1986; Shiyko & Pappas, 2009; Utzman et al., 2007; Wheeler & Arena, 2009), undergraduate GPA (Andrews et al., 2006; Day, 1986; Fell et al., 2015; Jewell & Riddle, 2005; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Thieman et al., 2003; Utzman et al., 2007; Wheeler & Arena, 2009), prerequisite GPA (Dockter, 2001; Fell et al., 2015; Thieman et al., 2003), age at admission (Dockter, 2001; Ruscingo et al., 2010; Shiyko & Pappas, 2009; Thieman et al., 2003), race (Day, 1986), interview scores (Shiyko & Pappas, 2009), undergraduate school selectivity (Andrews et al., 2006; Wheeler & Arena, 2009), HSRT scores (Huhn & Parrott, 2017), and even first-year GPA (Dockter, 2001) have demonstrated some predictive value for various levels of success in a PT program, either defined as GPA within a PT program at various time points, probationary status or success on the NPTE licensure exam.

Jewell and Riddle's (2005) study was most closely related to this study where preadmission criteria including undergraduate GPA, math and science GPA, and GRE scores were analyzed as potential predictors of probationary status. While this was with a masters-level PT program, vGRE scores, qGRE scores and undergraduate GPA were predictive of probationary status, but only vGRE scores remained in the model when tested with a validation set. This study only looked at the preadmission criteria and did not look at measures of clinical reasoning, critical thinking disposition or self-reflection. Results of the current study did not match Jewell and Riddle's (2005) findings in regards to preadmission data.

This study aimed to evaluate the relationship between clinical reasoning skills, as measured by the HSRT-N, and academic success and clinical readiness. The HSRT, which is the earlier version of the HSRT-N, has been used with students in DPT programs. One study

evaluated change in HSRT scores in DPT students at three different time points in two DPT programs: (1) at the beginning of the program, (2) prior to terminal clinical experiences, and (3) prior to graduation (Huhn et al., 2013). In that study, HSRT total scores, deduction scores and analysis scores changed from time 1 to time 2, but not time 2 to time 3 (Huhn et al., 2013). This demonstrates the greatest change in clinical reasoning skills changed during the didactic portion of the program; however, time 1 to time 2 in each of the programs was two to three years in length. Because there was not an additional HSRT measure in the middle of the didactic portion there is no way to tell at which point during the didactic portion of the curriculums that the HSRT scores and clinical reasoning improved, or improved the most. Another study demonstrated that HSRT scores had a moderate correlation to first-year GPA in the program and added to a predictive model for NPTE scores (Huhn & Parrott, 2017). Findings from the current study did not demonstrate the same relationship between the HSRT-N and first-year GPA. The reason for this may be the fact that the program in the current study does not use a traditional plus/minus grading scale which is used in the vast majority of PT programs. It is possible that the lack of a plus/minus grading scale may not be as discriminative for GPA, and thus may be the reason that the current study did not find predictors of first-year GPA.

The first year of the program in the current study includes primarily foundational background knowledge and introductory levels of examination, evaluation and intervention. The curriculum advances in the second year with more diagnosis or practice-pattern-specific management for patients with orthopedic, neurologic and cardiopulmonary conditions in addition to the geriatric and pediatric populations. While the first year involves teaching clinical reasoning, the second year has an emphasis on a much higher level of the clinical reasoning process which includes pattern recognition and the students' previous clinical experience. Both

pattern recognition and clinical experience have been defined as components of the clinical reasoning process (Hendrick, Bond, Duncan, & Hale, 2009). Since the first year in this program does not involve as high of a level of clinical reasoning as it is more focused on gaining foundational knowledge to apply later, perhaps the HSRT-N would be better served as an instrument to be used in the second year of the program. The program under study is similar to the programs in the previous study (Huhn et al., 2013) where each program begins with a year of didactic work, followed by shorter or introductory clinical experiences, followed by further didactic coursework prior to terminal clinical experiences. It is possible that clinical reasoning and thus HSRT or HSRT-N scores demonstrate the greatest growth in the higher-level patient management courses where the students have at least some clinical experience on which to reflect. No studies have evaluated these changes in HSRT scores from one year to the next in PT education.

The results also indicated that besides the preadmission criteria of qGRE and interview scores, the HSRT-N subscales were the only other variables that had at least low correlations with HMP I grades, the strongest of those being between Interpretation scores from the HSRT-N and Clinical Reasoning grades ($r = .51$, $p = .001$). The fact that the HSRT-N had at least low correlations with HMP I performance may indicate that the HSRT-N may be better used for assessing practical examination performance or performance during clinical experiences later in the curriculum.

Previous studies looking at the CCTDI in PT students demonstrated inconsistent or ambivalent scores (Domenech & Watkins, 2015) and low scores in the truth-seeking and confidence in reasoning (Bartlett & Cox, 2000); however, the second study was in undergraduate PT students. Another study demonstrated improvements in CCTDI and subscale scores over the

course of the middle year of a master's-level PT program with the greatest improvements in truth-seeking and confidence in reasoning scores (Bartlett & Cox, 2002). A third study looked at CCTDI scores in a master's-level PT program which did not show change over time in overall scores, but did show changes in truth-seeking, confidence in reasoning and systematicity over time (Wessel & Williams, 2004). The current study did not demonstrate any differences in CCTDI scores between students who experienced academic success or difficulty. Contrary to these previous studies, the mean CCTDI scores for this study were generally in the positive range including confidence in reasoning, with only systematicity and truth-seeking scores being in the inconsistent range.

Results from the current study and previous studies indicate that students entering a PT program may have lower critical thinking disposition in the areas of truth-seeking, confidence in reasoning and systematicity. Truth-seeking is defined as "the habit of always desiring the best possible understanding of any given situation; it is following reasons and evidence where ever they may lead, even if they lead one to question cherished beliefs" (Insight Assessment, 2018a). Confidence in reasoning is defined as "the habitual tendency to trust reflective thinking to solve problems and make decisions" (Insight Assessment, 2018a). Systematicity is defined as "the tendency or habit of striving to approach problems in a disciplined, orderly, and systematic way" (Insight Assessment, 2018a). While there were no significant differences in this study between students who were successful and those who experienced difficulty, the consistently low CCTDI subscale scores in PT students may give some insight to faculty in areas that need to be more explicitly addressed when teaching clinical reasoning and critical thinking. The fact that both CCTDI scores and HSRT scores have demonstrated improvement over time in a PT program supports the thought that clinical reasoning is being taught in PT education programs. The

CCTDI just may not be an appropriate tool to help determine who will be successful in a PT program, or at least in the first year of a professional program.

The SRIS Insight scores were the only significant difference between the academic success and difficulty groups in this study. Those who experienced academic difficulty in the first year of the DPT program in this study had significantly lower insight scores than those in the academic success group. Again, insight is defined as "the clarity of understanding of one's thoughts, feelings and behavior" (Grant et al., 2002, p. 821). As insight scores have demonstrated a positive correlation with cognitive flexibility (Grant et al., 2002), this may lead to some insight as to the challenges experienced in the first year of a DPT program. Cognitive flexibility refers to one's understanding that there may be more than one solution to a problem, their willingness to adapt their thought processes in these situations, and their self-efficacy to do so (Grant et al., 2002).

While insight and cognitive flexibility have not specifically been studied and reported in the physical therapy literature, these constructs have been evaluated in other health care programs. One study was performed with sixth-year medical students in which two groups of students participated in a clinical reasoning seminar. Both groups of students talked through cases with a tutor in order to develop hypotheses and differential diagnosis, refine hypotheses and develop a final diagnosis. The intervention group were explicitly encouraged to practice insight throughout the case discussion. While there was no statistically significant difference between groups in the accuracy of the final diagnosis, the intervention group was significantly more likely to list the correct diagnosis in their initial differential diagnoses (Nendaz, Gut, Louis-Simonet, Perrier, & Vu, 2011).

Cognitive flexibility has also been associated with diagnostic expertise in clinicians. Those who demonstrate cognitive flexibility have demonstrated the ability to use both analytic and responsive approaches to the diagnostic process, are more willing to refine hypotheses as more information is gathered about a patient, and are better able to interpret that information from multiple perspectives (Bordage, Grant, & Marsden, 1990). This may show that those who do practice insight and cognitive flexibility more are able to see a broader picture of potential diagnoses or answers, and approach a problem from multiple perspectives. The ability to practice insight or be more flexible in thinking could lead to success both in a DPT program, but also as a practicing clinician, especially when patients or patient cases do not present like the typical "textbook" cases.

Interestingly, while insight scores have demonstrated a positive correlation with cognitive flexibility, they have also demonstrated a negative correlation with anxiety, stress, depression and alexithymia, which is the ability to identify and express one's feelings (Grant et al., 2002). Other studies have demonstrated positive correlations between insight scores and psychological well-being (Harrington, Loffredo, & Perz, 2014; Stein & Grant, 2014). A previous study has demonstrated that entry-level DPT students have higher stress and anxiety levels than age and gender matched working individuals, although in this study the levels of anxiety did not predict performance (Frank & Cassady, 2005). The SRIS scores also did not correlate with academic performance in medical students in another study (Carr & Johnson, 2013). Contrary to these findings, Schwartz, Evans and Agur (2015) evaluated stress and anxiety in relation to academic performance in PT students during timed and untimed anatomy tests. Findings of this study indicated that anxiety was higher and test performance was lower in the timed tests versus the untimed tests, which supports the notion that increased anxiety can negatively affect academic

performance (Schwartz et al., 2015). Lower SRIS-I scores in the difficulty group in this study may indicate lower levels of cognitive flexibility, and higher levels of stress or anxiety that may have impacted their performance during the first year of the program. Similarly, a previous study in nursing education demonstrated that stress and insight scores were significantly correlated with nursing students' clinical competence, where lower levels of stress and higher insight scores led to increased competence (Eng & Pai, 2015).

A previous study in PT education that utilized the SRIS had their students take the SRIS at a similar time point in the program as the current study (Huhn, 2017). Scores were compared between the two studies and similar mean scores were found where the SRIS total scores were within .82 points, SRIS-SR scores were within 2.02 points and SRIS-I scores were within 1.2 points of one another. The similarity in scores may demonstrate the usefulness of the SRIS as a reliable tool in PT education.

The SRIS and its subscales demonstrated some significant positive correlations with both the HSRT-N and CCTDI along with their subscales in this study. This may further support the thought that self-reflection is associated with the critical thinking and clinical reasoning process. The previous study using the SRIS in PT education (Huhn, 2017) found a significant improvement in SRIS total scores and SRIS Self-Reflection scores following a six-week critical reasoning course. Findings of this study may demonstrate self-reflection and insight are precursors or key components of the clinical reasoning process. The difference between groups in SRIS-I scores also lends to the fact that there are several other components that contribute to one's ability to successfully transition into graduate level PT education, and other factors such as mental health, stress, anxiety and depression should be considered. The SRIS has the potential to be a useful instrument in identifying students that may struggle in the first year during this

stressful transition. While the author does not believe that those who appear to be under stress should be eliminated from the applicant pool, identifying those early who may be under greater levels of stress would potentially be helpful in directing them to appropriate resources to develop strategies for coping skills and stress management that they need in order to improve their chances of success.

Finally, there were some low to moderate positive correlations between scores on HMP I and some of the other variables in this study. However, it should be noted that all students who completed the first year and HMP I did receive passing scores, meaning that they met the expectations. The correlations essentially demonstrated that higher performers on the HMP I had higher scores on the preadmission variables or the questionnaires and tests used in this study, although those who scored lower on HMP I still performed adequately. Not all of these correlations have a clear connection as far as similar constructs. Part of the reason why this may be so challenging to compare these two is that the rubric does not have clearly defined criteria for each of the areas measured. It is up to the individual faculty who graded the student to determine what constitutes clinical reasoning, professionalism, communication and safety. The preadmission criteria of qGRE scores had a low positive correlation to professionalism scores, to which there is not a clear connection. Other correlations make more sense, most significantly the moderate positive correlation between clinical reasoning scores and interpretation scores, and the low positive correlation between clinical reasoning scores and numeracy scores on the HSRT-N. As the HSRT-N is designed to measure clinical reasoning skills, having higher scores on the HSRT-N prior to starting the program may have aided the students in developing stronger clinical reasoning skills throughout the first year. Interview scores had low positive correlations with communication scores. Since the interviews consist of assessing the potential PT students'

communication skills, it makes sense that the higher the student scored on the interview would lend to stronger communication during HMP I.

The most interesting finding is the three significant low positive correlations with safety scores that included interpretation, inference and evaluation scores on the HSRT-N. Safety on HMP I is determined by both the students' safety with body mechanics during the examination and intervention, as well as relative to the patient in terms of their choices of intervention, appropriateness of the intervention based on the specific patient and their characteristics and as far as setting up the treatment area and guarding during transfers or gait. In order to maintain safety of the patient and therapist, the student must put together all of the pieces of the patient case to make the best decision. This decision-making process would clearly include interpreting the data and figuring out what is important and giving meaning to the data, inferring safety and patient response based on the information given and evaluating the quality of the information given to make their decisions.

While there are some clear connections between some of the correlations with HMP I and other variables in this study, the lack of clear connections between other variables, the lack of clearly defined constructs of measurement, faculty variability, and the lack of established reliability and validity of the rubric encourages caution to be taken when interpreting the significance of these results. It also should be taken into consideration that all of the students who participated in HMP I did perform to the level of expectation. Therefore, if a student was able to complete the first year of the program (in this particular cohort), they had developed the knowledge and skills to be deemed clinically ready. This still may indicate that performing strongly on the qGRE, the interview, and certain subscales of the HSRT-N could lead to higher performance on HMP I and possibly in the clinical setting.

Study Limitations

There are several limitations to note in the current study. The study was underpowered due to a small sample size and may serve better as a pilot study for the use of the HSRT-N, CCTDI and SRIS. The HSRT-N has not been used in any published studies at this point with PT education. While results of the HSRT-N are well-correlated with HSRT scores, results of this study did not demonstrate its usefulness for the proposed purpose. Its use may still be warranted in PT education due to previous findings with the HSRT in studies with larger sample sizes and at different time points within the curriculum. The current study also did not produce any significant findings in regards to preadmission variables, however, the results of previous studies still warrant their use for admissions committees and future studies.

The difference in insight scores between groups should be taken with caution due to the small sample size, in addition to the fact that there were no significant differences with all data points included. However, excluding the data point in question did have positive effects on the distribution of the data. Along with increasing the test statistic of the Shapiro-Wilk, excluding the data point in question brought the mean 0.16 points closer to the median and lessened the standard deviation by 0.38, which indicates a more normally distributed data set. It is possible that the participant's score could have either decreased or increased had they answered the questions consistently. There is no way of knowing what effect consistent answers by this participant would have on the scores, so again the results should be taken with caution.

Conclusion

This study did not identify any predictors of academic success or clinical readiness in the first year of a DPT program, but did demonstrate that those who experienced academic difficulty did have lower insight scores on the SRIS. While reflection has been associated as a key

component of clinical reasoning (Jensen et al., 2000), this study did not find any differences between groups in academic standing on the overall SRIS or SRIS Self-Reflection scores. Combining these results, with the fact that there were no significant differences between groups in academic standing in the HSRT-N scores or the CCTDI scores, may indicate the first year of a DPT program might be too early to use measures of clinical reasoning or critical thinking to determine who is at risk for academic difficulty. Clinical reasoning is a skill that is taught in DPT programs and is expected to grow over time. However, looking at precursors to or components of clinical reasoning, such as insight, self-reflection, or critical thinking skills and disposition, may still give faculty insight as to how to assess and develop clinical reasoning skills. Perhaps the second year of the program where many DPT programs advance to more integrated clinical reasoning with higher levels of patient management courses would be a more appropriate time to assess clinical reasoning skills and disposition. This could potentially advise faculty on who may struggle with clinical reasoning on terminal clinical experiences and the NPTE. The SRIS had significant correlations with the HSRT-N and CCTDI, which may indicate its usefulness as an additional tool to provide a more holistic view of the students' clinical reasoning development.

With previous studies demonstrating higher levels of stress and anxiety in DPT students compared to other age-matched individuals (Frank & Cassady, 2005), and negative effects of stress and anxiety on test performance (Schwartz et al., 2015), insight scores may be a useful tool to use at the beginning of a program to assess who may be at risk for academic difficulty due to challenges with cognitive flexibility, stress and anxiety. It also may be useful to introduce a measure of stress and anxiety early in a program in order to help at-risk students get the assistance or professional help they need to be successful.

Additionally, previous studies have demonstrated that some of the variables in this study have demonstrated predictive ability for student success in a PT program or on the licensure exam, but these variances were generally less than 50%. This leaves over half of the variance unaccounted for. Considering these factors, there is clearly more than one's ability to take a test, perform well in undergraduate coursework and successfully manage transition from undergraduate school or previous work life to a demanding professional curriculum. The variability among DPT programs also presents a challenge for utilizing the results of this and previous studies in identifying students who may struggle. Faculty should be advised that there is no perfect recipe to determine who will be successful in a DPT program, but they can potentially utilize the predictive variables in this study and previous studies to help identify different areas of weakness in students in order to provide them the resources to help them be successful.

Future research should consider evaluating levels of stress or anxiety, self-reflection and insight, and critical thinking or clinical reasoning skills both prior to and at varying time points within the curriculum. It is also possible that assessing some of these measures prior to starting the program may paint a very different picture of the students' levels of stress, anxiety, disposition, and other factors related to clinical reasoning than at different points in the middle of the program. Students may not have realistic or accurate expectations of the rigors of a program prior to beginning coursework. Many PT faculty perform these tasks informally throughout the curriculum as part of the faculty and advising duties that are expected of them. However, adding formal measures may be beneficial to better quantify and analyze these factors.

While many PT programs have science pre-requisites that are required for admission into a program, students come from varying backgrounds of undergraduate degrees and previous work experience. Perhaps students who did not earn degrees in a science-related field are more

likely to have difficulty in a science-heavy curriculum. Prior studies have shown that undergraduate school selectivity has contributed to predictive models for success in PT programs (Wheeler & Arena, 2009), so it is possible that the area of study could also lead to success or challenges in a demanding PT curriculum.

Since it is not expected that quantitative measures can predict 100% of the variance associated with student academic success or difficulty, it could be useful perform qualitative analysis with students who struggle in a PT program. It is possible that there are some unique personal or generational components that have not been explored, and the personal stories of these students may give researchers and faculty insights into additional components that could be explored.

Lastly, while PT programs are required to meet CAPTE criteria within the curriculum, it is possible that the variance between programs in how the curriculum is set up, how the content is delivered and when students participate in their clinical experiences could also be factors contributing to success or difficulty within a PT program. Students come in with different learning styles as well, which may contribute to success based upon the learning styles and teaching strategies used in their particular PT program. Future studies could also incorporate evaluating the difference between DPT program structure and student learning style in relation to success in the classroom, clinical experiences and the NPTE.

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Table 1

Descriptive Statistics and Comparison between Preadmission Criteria and Academic Standing

	Total Sample (N = 42)	Academic Success (N = 35)	Academic Difficulty (N = 7)	
	M (SD)	*M (SD)*	*M (SD)*	*p*
Undergraduate GPA	3.55 (.18)	3.53 (.19)	3.61 (.15)	.347
Prerequisite GPA[a]	3.30 (.31)	3.37 (.30)	3.28 (.32)	.636
Total GRE	303.95 (7.30)	304.20 (7.78)	302.71 (4.31)	.629
Verbal GRE	151.76 (4.54)	151.69 (4.61)	152.14 (4.48)	.811
Quantitative GRE	152.19 (4.08)	152.51 (4.17)	150.57 (3.41)	.255
Analytical GRE[a]	4.0 (0.50)	4.0 (1.0)	4.0 (1.0)	.899
Interview Score[a]	0.75 (0.25)	0.75 (0.25)	0.75 (0.25)	.540

Note: GPA = grade point average; GRE = Graduate Record Examination score

[a] Scores reported as median and interquartile range

Table 2

Descriptive Statistics and Comparison between Health Sciences Reasoning Test with Numeracy and Academic Standing

	Total Sample (*N* = 42)	Academic Success (*N* = 35)	Academic Difficulty (*N* = 7)	
	M (SD)	*M (SD)*	*M (SD)*	*p*
HSRT-N Total	82.23 (5.81)	82.43 (5.37)	81.29 (8.09)	.640
Analysis	83.14 (8.00)	83.29 (7.47)	82.43 (10.97)	.799
Interpretation[a]	72.00 (16.00)	72.00 (16.00)	72.00 (22.00)	.931
Inference	82.62 (7.31)	83.06 (7.05)	80.43 (8.83)	.392
Evaluation	72.81 (9.41)	73.09 (9.67)	71.43 (8.52)	.676
Explanation[a]	82.00 (14.00)	82.00 (14.00)	82.00 (9.00)	.770
Induction[a]	88.00 (9.00)	88.00 (9.00)	85.00 (6.00)	.470
Deduction	79.00 (8.97)	79.06 (8.22)	78.71 (12.91)	.928
Numeracy	75.43 (8.94)	75.51 (0.75)	75.00 (9.75)	.892

Note: HSRT-N = Health Sciences Reasoning Test with Numeracy

[a] Scores reported as median and interquartile range

Table 3

Descriptive Statistics and Comparison between California Critical Thinking Disposition Inventory and Academic Standing

	Total Sample (N = 42)	Academic Success (N = 35)	Academic Difficulty (N = 7)	
	M (SD)	*M (SD)*	*M (SD)*	*p*
CCTDI Overall	302.62 (22.79)	302.71 (22.66)	302.14 (25.29)	.953
Truth-Seeking	38.50 (4.93)	38.34 (5.08)	39.29 (4.38)	.650
Open-Mindedness	44.74 (3.99)	44.49 (4.15)	46.00 (3.06)	.366
Inquisitiveness	46.05 (5.75)	46.29 (5.55)	44.86 (7.03)	.555
Analyticity	45.43 (3.90)	45.34 (3.81)	45.86 (4.63)	.755
Systematicity	40.48 (6.38)	40.83 (6.48)	38.71 (5.94)	.430
Confidence in Reasoning	44.17 (6.40)	44.09 (6.62)	44.57 (5.56)	.857
Maturity of Judgment	43.43 (4.56)	43.49 (4.64)	43.14 (4.48)	.858

Note: CCTDI = California Critical Thinking Disposition Inventory

Table 4

Descriptive Statistics and Comparison between SRIS and Academic Standing

	Total Sample (*N* = 42)	Academic Success (*N* = 35)	Academic Difficulty (*N* = 7)	Mean difference	
	M (SD)	*M (SD)*	*M (SD)*		*p*
SRIS total	89.52 (9.73)	90.46 (10.22)	84.86 (5.05)	5.60	.167
SRIS Self-Reflection	53.69 (7.55)	54.09 (8.09)	51.71 (3.59)	2.37	.232
SRIS Insight	35.83 (4.56)	36.37 (4.71)	33.14 (2.48)	3.23	.088
SRIS Insight outlier excluded	36.10 (4.28)[a]	36.71 (4.34)[b]	33.14 (2.48)	3.56	.043*

Note: Abbreviations: SRIS, Self-Reflection and Insight Scale.

[a] *N* = 41 with outlier excluded

[b] *N* = 34 with outlier excluded

*indicates statistical significance at $p < .05$

Table 5

Health Sciences Reasoning Test with Numeracy Correlations with Self-Reflection and Insight Scale

Variable	SRIS total	Self-Reflection	Insight
HSRT-N total	.19	.10	.25
Analysis	.13	.12	.08
Interpretation	-.08	-.10	-.01
Inference	.14	.03	.25
Evaluation	.41*	.37*	.26
Explanation	-.02	.02	.02
Deduction	-.05	-.08	.10
Induction	.26	.17	.39*
Numeracy	-.01	< .01	-.01

Note: Abbreviations: HSRT-N = Health Sciences Reasoning Test with Numeracy; SRIS = Self-Reflection and Insight Scale.

*indicates statistical significance at $p < .05$

Table 6.

California Critical Thinking Disposition Inventory Correlations with Self-Reflection and Insight Scale

Variable	SRIS Total	Self-Reflection	Insight
CCTDI Overall	.62**	.49*	.51*
Truth-Seeking	.15	.23	-.06
Open-Mindedness	.30*	.32*	.12
Analyticity	.26	.13	.33*
Systematicity	.50*	.24	.67**
Confidence-in-Reasoning	.55**	.47*	.39*
Inquisitiveness	.64**	.55**	.45*
Maturity of Judgment	.19	.15	.14

Note: CCTDI = California Critical Thinking Disposition Inventory; SRIS = Self-Reflection and Insight Scale.

*indicates statistical significance at $p < .05$

**indicates statistical significance at $p < .001$

Appendix A

Recruitment Letter

Thank you for taking the time to hear about this research study. The proposed study will be used to evaluate potential predictors of academic success and clinical readiness in the first year of a doctor of physical therapy (DPT) program. If potential predictors are found with this study, DPT faculty could use the results in the future to help identify students who will be successful in their program, as well as to identify students who may struggle. Identifying students who may struggle could allow the faculty to implement strategies early on in the DPT program to help the students succeed.

Michael Obert (MO) will be the primary investigator in the proposed study. For this study, all potential participants will be given a unique identifying code prior to the start of the study. All data obtained by MO will be in the form of these codes in order to ensure anonymity throughout and after the study. Your participation in this study is voluntary. Choosing to participate or not participate in the study will have no impact, positive or negative, on your status in the DPT program. Should you choose to participate, you will be asked to complete three surveys in the first few weeks of the DPT program. If you choose to participate your academic records, including GRE scores, undergraduate and science GPA, first-year GPA, and demographic information will also be accessed and recorded in a de-identified manner. At the conclusion of the first year in the DPT program, MO will analyze the de-identified data to determine if there are relationships between these variables. You will also have the right to withdraw from the study at any time without any repercussions.

The completion of all three surveys is estimated to take approximately 60-75 minutes. Potential risks of participation in the study are anticipated to be minimal and could include

emotional distress associated with taking the tests and questionnaires and receiving your results on these forms. Potential benefits of participation are also minimal and could include possible insights into your own clinical reasoning skills, critical thinking disposition, and self-reflection.

After hearing about the study, you may set up an appointment with MO via email (Michael.obert@msj.edu) to discuss any questions or concerns you may have prior to making a decision. He will answer any questions that do not affect the validity of the study.

Thank you very much for your time and consideration for the proposed study,

Michael Obert

Michael.obert@msj.edu

513-244-4305

Appendix B

SRIS

Please read the following questions and circle the response that indicates the degree to which you agree or disagree with each of the statements. Try to be accurate, but work quite quickly. Do not spend too much time on any question

THERE ARE NO "WRONG" OR "RIGHT" ANSWERS – ONLY YOUR OWN PERSONAL PERSPECTIVE

BE SURE TO ANSWER EVERY QUESTION ONLY CIRCLE ONE ANSWER FOR EACH QUESTION

1.	I don't often think about my thoughts	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
2.	I am not really interested in analyzing my behaviour	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
3.	I am usually aware of my thoughts	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
4.	I'm often confused about the way that I really feel about things	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
5.	It is important for me to evaluate the things that I do	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
6.	I usually have a very clear idea about why I've behaved in a certain way	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
7.	I am very interested in examining what I think about	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
8.	I rarely spend time in self-reflection	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
9.	I'm often aware that I'm having a feeling, but I often don't quite know what it is	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
10.	I frequently examine my feelings	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
11.	My behaviour often puzzles me	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
12.	It is important to me to try to understand what my feelings mean	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
13.	I don't really think about why I behave in the way that I do	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
14.	Thinking about my thoughts makes me more confused	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
15.	I have a definite need to understand the way that my mind works	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
16.	I frequently take time to reflect on my thoughts	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
17.	Often I find it difficult to make sense of the way I feel about things	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
18.	It is important to me to be able to understand how my thoughts arise	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
19.	I often think about the way I feel about things	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6
20.	I usually know why I feel the way I do	Disagree Strongly 1	Disagree 2	Disagree Slightly 3	Agree Slightly 4	Agree 5	Agree Strongly 6