

REVIEW

Use of Personality Frameworks in Health Science Education

Lindsey Childs-Kean, PharmD, MPH,^a Mary Edwards, EdD,^b Mary Douglass Smith, PharmD^c

^a University of Florida, College of Pharmacy, Gainesville, Florida

^b University of Florida, Health Science Center Libraries, Gainesville, Florida

^c Presbyterian College, School of Pharmacy, Clinton, South Carolina

Submitted June 21, 2018; accepted February 24, 2020; published August 2020.

Objectives. To review the use of personality frameworks by educators as a tool to increase self-awareness in health professions students.

Findings. After screening titles, abstracts, and/or the full text of the 415 articles identified in an initial search, 71 articles involving personality frameworks were included in the study. Several different personality frameworks, including the Five-Factor Model, Myers-Briggs Type Indicator, the Rational Experiential Inventory, and the CliftonStrengths assessment, were used in various health science education disciplines, including medicine, nursing, and pharmacy. Most publications were descriptive in nature and only reported on the personality attributes of the given research cohort. Some studies correlated personality framework results with either learning or non-cognitive outcomes. Very few studies described using personality frameworks as a tool for self-awareness and growth.

Summary. While some personality frameworks have been used in health science education for multiple purposes, there is currently a lack of published evidence documenting the use of these frameworks for self-awareness in students.

Keywords: health science education, personality, affective domain

INTRODUCTION

The development of a student pharmacist includes cultivating their knowledge, skills, and attitudes to prepare them to enter pharmacy practice after graduation.¹ Though knowledge and skills can be introduced and reinforced through the didactic educational program, professional attitudes can be more difficult and complex to nurture. Some personality attributes of a pharmacy professional may come naturally to a student, whereas other attributes must be developed. Furthermore, knowledge of the absence of a desired characteristic could serve as an essential first step. For instance, a student could have inherent leadership skills but struggle with innovative thinking and creating new approaches to resolving problems. The student would need to first become aware of their lack of creative thinking before they would know to seek out opportunities to test and build this mindset.

The need to encourage self-awareness (knowledge of one's own motivations, beliefs, and emotions) in Doctor of Pharmacy (PharmD) students is part of the guidance given by the Accreditation Council for Pharmacy Education

(ACPE) to pharmacy educators in Standards 2016 (Key Element 4.1).¹ However, the need to cultivate self-awareness in students is not unique to pharmacy education. The Liaison Committee on Medical Education (LCME) includes "self-directed and life-long learning" as a standard (Standard 6.3) that includes medical students' self-assessment of learning needs.² Accountability for one's self and continuous professional engagement and lifelong learning is described in Essential VIII of The Essentials of Baccalaureate Education for Professional Nursing Practice by the American Association of Colleges of Nursing.³ Health professional programs across the spectrum are responsible for developing a path to self-awareness for students, and personality frameworks may be an underused tool for this development.

Personality frameworks vary in their design, but all are intended to measure and elucidate an element or set of elements of character, behavior, disposition, and/or temperament.⁴ These frameworks provide a structure for organizing research and common language for those studying personality in educational, organizational, and clinical settings.⁵ When a subject takes a personality test and reads the interpretation of the result, they may find that it is surprisingly accurate or exposes some part of their personality previously unknown. This self-awareness can help the subject approach their own

Corresponding Author: Lindsey Childs-Kean, University of Florida, College of Pharmacy, PO Box 100486, Gainesville, FL 32610. Tel: 352-273-5715. Email: Lchilds-kean@cop.ufl.edu

work in a manner that matches their style and work better as a team with colleagues, faculty members, and preceptors.⁶

There are many personality frameworks available; four popular and widely used frameworks are the Five-Factor Model, Myers-Briggs Type Indicator, Rational Experiential Inventory, and CliftonStrengths. The Five-Factor Model is built on five core aspects of personality: openness to experience (how open a person is to new ideas), conscientiousness (how goal-directed and persistent a person is), extraversion-introversion (how much a person is energized by the outside world), agreeableness (how much a person puts others' interests ahead of their own), and neuroticism (how sensitive a person is to stress).⁷ The Myers-Briggs Type Indicator (MBTI) details 16 different personality types based on an individual's preferences for perception and judgement.⁸ The MBTI asks questions related to how the individual focuses on the world (extrovert or introvert) and on basic information interpretation (sensing or intuition).⁸ Additionally, the individual reflects their decision-making based on logic or sensitivities (thinking or feeling) and orientation to the outer world (judging or perceiving).⁸ At the conclusion of the test, the individual receives a personality score, denoted by an abbreviation, eg, "ENTJ," in which each letter stands for an aspect of the test taker's personality (ie, extroverted, intuitive, thinking, judging).

A similar test to the MBTI is the cognitive-experiential self-theory (CEST) that proposes a dual-process theory of decision-making, including the analytical-rational system and the intuitive-experiential system. Individuals tend to prefer one mode over another, and the preferred style is determined by the Rational Experiential Inventory (REI-40).⁹ This validated assessment uses a Likert scale questionnaire to evaluate the individual's thought processes and emotions when making a decision, eg, "I prefer complex problems to simple problems."⁹ Finally, the CliftonStrengths assessment presents 177 paired statements, and the individual chooses which one best describes himself or herself.¹⁰ The assessment measures recurring patterns of thought, feeling, and behavior and highlights the top five strengths, such as "Learner," "Relator," and "Discipline."¹⁰

While the use of personality frameworks has been widespread in the general population and in some educational settings, their use in health sciences education has not been formally explored. The objective of this review was to identify what personality frameworks have been used in pharmacy and other health sciences education and in what ways the results are being used, if any, to enhance students' self-awareness.

METHODS

Multiple bibliographic databases covering medical, education (general and medical), psychology, and social and behavioral science literature were searched in November 2018. Seven databases were searched: PubMed, EBSCO's CINAHL, Education Full Text, Professional Development Collection, PsycInfo, ProQuest's ERIC database, and Web of Science. These databases were searched in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.¹¹ The searches used subject headings and truncated, phrase-searched (as appropriate) keywords for the concepts of personality and learning style assessment and health professions. Sample search terms included "personality test," "personality assessment," "Myers-Briggs," "Kolb learning style inventory," "VARK," "Big Five," "Rational Experiential Inventory-40," and "StrengthsFinder." The search included the following health science disciplines: medicine, pharmacy, dentistry, nursing, veterinary medicine, physician assistant, occupational therapy, physical therapy, dietetics, speech language pathology, and allied health professions. A sample PubMed search string is in Appendix 1. There were no date restrictions or study type limitations in the search; the only limit in the search was English language. Additionally, key pharmacy education journals were hand searched using the terms "personality test," "personality framework," and "personality assessment."

After removal of duplicate abstracts, two authors screened the titles and abstracts independently for their relevance to personality and/or learning style framework use in health science education students. Any discrepancies were discussed between the two screeners until consensus was reached. Full texts of the articles were retrieved and assessed on preselected inclusion/exclusion criteria, which included use of a personality or learning style framework and health science students. Reasons for exclusion were used for both the title and abstract and the full-text review steps and included: no students included, no personality or learning style framework used, only undergraduate non-health professions students included, article not in English, validation of instrument study, no full-text available, and article type was a commentary. The articles were further divided with regards to whether the article used a personality framework, a learning style inventory framework, or both.

Data extraction from included articles included citation details, study type, type of health profession student included in study, which personality and/or learning style framework was used, and any learning or non-cognitive outcome reported. Articles using the same framework

were grouped and reviewed for how the framework was used in health science education students.

RESULTS

In the initial database search, we found 415 articles. After removing duplicates, 302 unique results remained. After reviewing titles and abstracts, we agreed on including 272 of the 302 titles/abstracts (90% agreement). For the 30 articles in which there were differences of opinion, we came to a consensus about inclusion or exclusion. The most common reason for discrepancy involved inclusion or exclusion of articles on studies involving health science program applicants; the authors came to consensus to exclude studies that had only included applicants. Overall, 142 articles were excluded at the title and abstract review step, leaving 160 articles that required full text review. Of the 160, 59 additional articles were excluded after the inclusion/exclusion criteria was applied to the full text. This left 101 articles: 70 of the studies had used at least one personality framework, one study used both a personality and a learning style

framework, and 30 had used at least one learning style framework. A summarization of the search strategy is included as a PRISMA diagram in Figure 1.

The majority of the studies that involved a personality framework (44 articles, 62%) were from medical schools. Studies conducted by pharmacy (eight articles, 11%), dental (six articles, 8%), and nursing (five articles, 7%) education programs were also identified. Four articles were classified as “other” because they included other health science programs: speech-language pathology students,¹² veterinary nursing students,¹³ occupational therapy students,¹⁴ and veterinary students.¹⁵ Three articles evaluated multiple educational programs. Examples included Bloom and colleagues who compared student pharmacists to Master of Physician Assistant Studies (PA), Doctor of Physical Therapy (DPT), and Doctor of Osteopathic Medicine (DO) students.¹⁶ Van Fenema and colleagues compared medical students and music conservatory students.¹⁷ Avrech Bar and colleagues evaluated occupational therapy, physical therapy students, and nursing students.¹⁸ A description of each

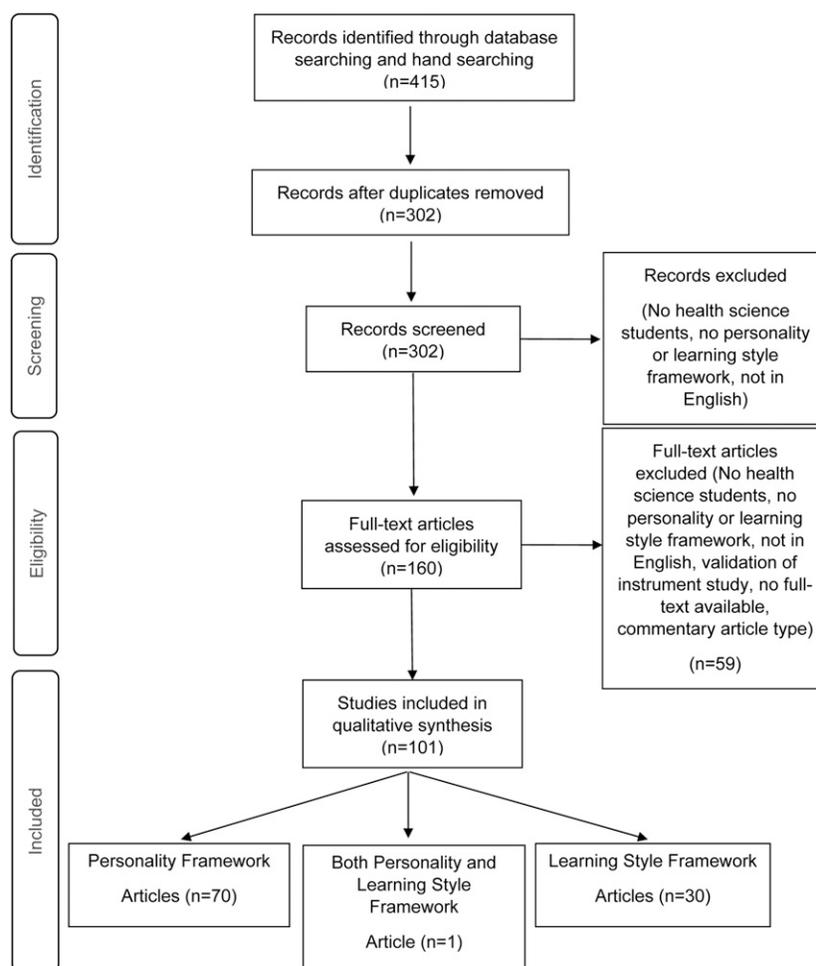


Figure 1. Frequency of Personality and Learning Style Frameworks in Health Science Education

personality type and article counts of student types is listed in Table 1.

Table 2 summarizes select results from each personality framework and the types of outcomes assessed. The Five -Factor Model, also known as the “Big Five,” “NEO,” and “OCEAN,” was the framework most often used (30 articles, 42% of included articles). Studies explored both descriptive and outcome-assessed measures, including both learning and non-cognitive outcomes. Identified studies often linked personality attributes within the Five-Factor Model framework, with a large variety of outcomes. For example, medical students who achieved higher scores in “openness to experiences” were more likely to underperform academically,¹⁹ delay their graduation,²⁰ have a higher incidence of non-suicidal self-injury,²¹ have higher patient empathy scores,²² and be inducted into the Gold Humanism Honor Society (a compassionate patient care society),²³

while Japanese dental students were more likely to study abroad.²⁴ Pharmacy students with higher levels of “agreeableness” were found to have lower levels of depression²⁵ and to take longer to complete examinations,²⁶ while medical students demonstrated an interest in homeopathy and acupuncture elective courses and in rural medical specialties.^{27,28} Finally, neuroticism was higher in medical students than in surgical trainees,²⁹ higher in dental students in Southeast Asia,³⁰ and lower among medical school graduates than medical students who left the program.³¹ There were no studies on the impact of the Five-Factor Model on skills assessment. Bob and colleagues used the framework to aid in a student’s self-awareness and examined the relationship between the five factors and a student’s attitude towards dissection in an anatomy class.³² Their findings revealed that students could be better prepared for the dissecting room experience if they were allowed to reflect on

Table 1. Personality Framework Descriptions, Article Count, Percentage of Included Articles, and Student Type

Personality Framework	Description	Article Count and Percentage of Included Articles	Student Type and Article Count
Five-Factor Model (aka “Big 5,” “NEO,” “OCEAN”)	Five core aspects of personality: openness to experience, conscientiousness, extraversion-introversion, agreeableness, and neuroticism	30 (42)	Medical (23) ^{19-23,27-29,31,32,64-76} Dental (3) ^{24,30,77} Pharmacy (2) ^{25,26} Speech pathology (1) ¹² Veterinary nursing (1) ¹³
Myers-Briggs Type Indicator (MBTI)	16 different personality types based on individual’s preferences for perception and judgement	12 (17)	Medical (4) ^{33,34,78,79} Nursing (3) ^{35,36,80} Pharmacy (2) ^{81,82} Dental (2) ^{83,84} Veterinary (1) ¹⁵
Cognitive-Experiential Self-Theory (REI-40)	Dual-process theory of decision making, including the analytical-rational system and the intuitive-experiential system	2 (3)	Pharmacy (1) ³⁷ Nursing (1) ³⁸
CliftonStrengths	Recurring patterns of thought, feeling, and behavior and highlights the top five strengths	3 (4)	Pharmacy (2) ^{39,40} Pharmacy, PA, PT, OM (1) ¹⁶
Others	Examples include: Eysenck Personality Questionnaire Temperament and Character Inventory Psychopathic Personality Inventory Revised Version Personal Quality Assessment Tool Standardized Assessment of Personality-Abbreviated Scale CPI 260 Personality test Birkman Method	22 (31)	Medical (18) ^{41-48,57,85-93} Nursing (1) ⁴⁹ Dental (1) ⁹⁴ OT (1) ¹⁴ Medical, Music (1) ¹⁷
Combination	Five-Factor Model + Others	2 (3)	Medical (1) ⁹⁵ Nursing, OT, PT (1) ¹⁸

PA=physician assistant, PT=physical therapy, OM=osteopathic medicine, OT=occupational therapy

Table 2. Select Outcomes of Personality Framework Studies

Personality Framework & Types of Outcomes Assessed	Select Significant Results
Five-Factor Model (aka “Big 5,” “NEO,” “OCEAN”)	
Descriptive studies	Medical students with high openness to experience had higher preference for rural medicine ²⁸
Correlation between personality and learning outcomes	Openness and agreeableness correlated with medical students delay in graduation ²⁰
Correlation between personality and non-cognitive outcomes	Agreeableness correlated with slower examination completion time in pharmacy students ²⁶
Framework used as a tool of self-awareness	Student’s awareness of the relationship between attributes and attitudes towards dissection in anatomy class ³²
Myers-Briggs Type Indicator (MBTI)	
Descriptive studies	Most common type in medical students was ENFP ³³
Correlation between personality and learning outcomes	Nursing students with introvert, sensing, thinking and judging preferences had better test scores ³⁵
Correlation between personality and non-cognitive outcomes	Introverts had a lower preference for team-learning in pharmacy program ⁸²
Framework used as a tool of self-awareness	Nursing students aware of how they relate to others and leading interprofessional teams ³⁶
Cognitive-Experiential Self-Theory (REI-40)	
Descriptive studies	Pharmacy students favored rational decision making over experiential decision making ³⁷
Correlation between personality and learning outcomes	Nursing students who favored rational thinking demonstrated greater accuracy in cue recognition ³⁸
CliftonStrengths	
Descriptive studies	Three studies showed 4 similar themes in the top 5 identified in students: achiever, learner, harmony, responsibility ^{16,39,40}
Others	
Descriptive studies	Medical students recognized as social influencers had high scores in empathy and sociability ⁴⁴
Correlation between personality and learning outcomes	Small correlations between Higgins Promotion and Prevention test and performance on dental lab activity ⁹⁴
Correlation between personality and non-cognitive outcomes	Medical students with lower cooperativeness of character were correlated with more academic burnout ⁴²
Framework used as a tool of self-awareness	Self-perceptions regarding stressed communication and behavior changed after Birkman Method testing and training ⁵⁷

their own tendency to be anxious in certain learning activities.³²

The next most used test was the Myers-Briggs Type Indicator (MBTI), used in 12 studies (17%). Most articles that studied MBTI were descriptive studies and/or assessed a non-cognitive outcome, such as identifying the most common attributes in first-year medical students³³ or using MBTI to identify burnout risk in medical students.³⁴ One study did assess the academic performance of nursing students related to MBTI attributes.³⁵ There were no studies on the impact of MBTI on skills assessments. Waite and McKinney conducted the only study that leveraged the student’s self-knowledge of personality type and applied it to a leadership development program in a nursing school.³⁶ Students reflected on individual

MBTI results to better understand how they relate to others and how this affects leadership of teams.

Two studies (3%) used the REI-40 framework. McLaughlin and colleagues examined the decision-making preferences of pharmacy students and found that students preferred rational thinking to experiential thinking, which was similar to other health professions students.³⁷ Burbach and colleagues found connections between thinking styles and learning outcomes, noting that nursing students with rational thinking styles were quicker to recognize symptoms and other cues in a simulated therapeutic activity.³⁸

The three articles (4%) that used the CliftonStrengths assessment were all descriptive studies that included pharmacy students.^{16,39,40} Interestingly, all three studies

found four common strengths in the student cohorts' top five strengths: achiever, harmony, learner, and responsibility.^{16,39,40} Bloom and colleagues found that the most common strengths were similar across PharmD, PA, DPT, and DO programs at one university, with learner and relator being in the top five for all four programs and responsibility and harmony being in the top five for three of the programs.¹⁶

Twenty-two articles (31%) used personality frameworks other than the primary four identified. Examples of these other frameworks included: resilience and burnout surveys,^{41,42} measures of empathy,^{43,44} temperament and character surveys,⁴⁵⁻⁴⁷ and several different international assessment tools. Most of the studies were descriptive or assessed non-cognitive outcomes, such as characteristics of medical specialties,⁴⁸ age and gender of nursing students,⁴⁹ and changes in personality traits before and after an occupational therapy program.¹⁴

Two of the studies that used "other" frameworks evaluated multiple professional student groups. Van Fenema and van Greel evaluated stress-related disorders and personality in both medical and music conservatory students using the Symptom Questionnaire and the Standardized Assessment of Personality-Abbreviated Scale.¹⁷ They found that medical students had more difficulty making and keeping friends and music students more easily lost their temper, while both groups scored highly in "perfectionism."¹⁷ Compared with the general population, both student groups seemed to experience more psychological problems, but there was no significant difference between the student groups.¹⁷ Avrech Bar and colleagues compared attitudes of nursing, physical therapy (PT), and occupational therapy (OT) students towards interprofessional collaboration, in addition to their personal resilience and personality traits (using the Five-Factor Model).¹⁸ They found a correlation between student perception of actual interprofessional cooperation and resilience in nursing students and between perception of actual cooperation and agreeableness, conscientiousness, and openness.¹⁸

DISCUSSION

According to the literature identified in our search, personality frameworks are most often used to describe the type of student who enters specific health professional programs. The review of the descriptive studies revealed that they typically described the most common characteristics of a particular cohort, such as medical students' interest in particular specialties based on personality classification. The literature does not describe, however, how (or if) the personalities of these cohorts may change

over time or how the students in the studies used this knowledge. One study that included reflection and identification of strengths and weaknesses was performed by Waite and McKinney, who conducted a study that utilized the MBTI in an 18-month leadership program for nursing students.³⁶ Reflection on personality preferences among team members was proposed to increase team effectiveness and mitigate challenging communication issues.³⁶ The authors shared the advice that "an individual's self-awareness is a strategic leader's greatest asset."^{36,50} There is some data to suggest that more self-awareness and emotional insight can lead to better learning outcomes and improved leadership skills. Arguedas and colleagues showed a correlation between student's completion of an emotional intelligence questionnaire and higher scores than those that did not.⁵¹ Additionally, Bill George's book, *True North: Discover Your Authentic Leadership*, suggests that leadership success is built on awareness of one's own values, motivations, and knowledge of the authentic self.⁵²

Similarly, Bob and colleagues concluded that medical students could be better prepared for dissection in an anatomy class by knowing their personality traits as identified by the Five-Factor Model framework. However, the researchers did not include any intervention in which the test results were shared with the students.³² Future directions for descriptive studies could include characterizing the personality of health science students using the growing list of personality frameworks, such as the DiSC assessment,⁵³ 16 Personalities,⁵⁴ Enneagram,⁵⁵ and the Four Tendencies.⁵⁶

By contrast, the review of identified studies that attempted to correlate personality framework results with either cognitive or non-cognitive outcomes had varied results. It was extremely difficult to find studies that further validated or disproved previous research related to outcomes. Some personality traits seemed to correlate with both "favorable" outcomes (eg, higher patient empathy scores²²) and "unfavorable" outcomes (eg, delayed graduation²⁰), which can leave learners and educators puzzled as to whether any given personality trait is preferable overall. Still missing from the literature would be larger, more comprehensive studies on possible correlations of personality features and academic success. These markers of success could potentially include on-time graduation, job and postgraduate training placement, and pass rates on licensing examinations. Additionally, research could be advanced on how the personality attributes augment or distract in team-based situations, either in educational settings or in professional settings. Evidence on effective team member personality traits and potential barriers to teamwork could be especially useful

in interprofessional collaborations. Future directions for outcome-based studies with personality frameworks could include the manner in which people with particular personalities interact with other people. One instance of this is the use of the Birkman Method assessment to evaluate students' communication styles and behaviors under stress and how students' self-awareness changed before and after the intervention.⁵⁷ More studies like this could allow the student the opportunity to "identify, create, implement, evaluate, and modify plans for personal and professional development for the purpose of individual growth," as self-awareness is described in the Center for Advancement of Pharmacy Education (CAPE) 2013 Educational Outcomes.⁵⁸

The benefit of increasing students' self-awareness would be to increase their emotional intelligence, of which self-awareness is a key component. Emotional intelligence (EI), the ability to be aware of and regulate one's emotions, has been correlated with both student and employee success in a variety of ways. A study that examined the correlation of emotional intelligence and nursing licensing examinations showed that two branches, understanding emotions and perceiving emotions, were both significant predictors of student performance on the National Council Licensure Examination-Registered Nurse (NCLEX-RN). The authors concluded that including training in perceiving and understanding emotions into the nursing curriculum may be beneficial in augmenting student success.⁵⁹ In medical education, EI assessments and training are used to prepare students for multiple emotional experiences that physicians encounter every day and how to handle highly emotionally charged situations.⁶⁰

Because these outcomes tied to EI and, indirectly, self-awareness, there appears to be opportunity for health science educators to further explore how the use of personality frameworks could best be used to improve student self-awareness. For example, the ideal role of the educator in assisting students with using results from a personality framework has yet to be described. Educators could guide students to not see an attribute as an excuse for an unsatisfactory outcome but rather an opportunity for the student to "seek personal, professional, or academic support," also described as an example learning objective in the CAPE outcomes.⁵⁸ More studies are needed to discover whether students are better served to be more self-aware of their attributes and leverage their strengths to succeed in the program and make allowances for potential hurdles. In experiential settings, studies could explore ways that preceptors can provide effective guidance for this objective, helping students better understand their own behavior, the behavior of others, and effective ways to interact with other personality types.⁶¹

The strengths of this literature review include the use of a medical librarian in conducting the searches and access to a broad range of databases to perform a thorough search of the literature. Although two of the three authors of this study are pharmacists, the study was not limited to pharmacy education but expanded to all health science education disciplines. Although there were no date restrictions used in the literature search, a limitation of the study was still the inability to formally capture articles published after the search was completed (November 2018). To minimize this limitation, the authors continued to hand search the table of contents of select pharmacy education journals for articles related to personality frameworks, and found two recent publications that each attempted to correlate personality framework results with cognitive outcomes. A specific example of new literature since we completed the literature search for this study is "Relationships Between Myers-Briggs Type Indicators and NAPLEX Performances," published in 2019, which examined the relationships between pharmacy students' MBTI results and their first-attempt NAPLEX scores, a cognitive learning outcome.⁶² Additionally, the article "The Role of Personality in Treatment-Related Outcome Preferences Among Future Pharmacists," was published in 2019 and concluded that pharmacy students with higher levels of conscientiousness from the Five-Factor Model personality framework may be more likely to recommend treatments that cause less pain and discomfort for a patient.⁶³

Based on this systematic review, there is little published evidence that instructors and preceptors are using personality frameworks as a tool for self-awareness in health sciences education. This could be due to the recent addition of the need to address self-awareness in health science education curricula. Further research is warranted to validate the use of these tools for self-discovery and a foundation of career-long, continuous professional development.

CONCLUSION

Several personality frameworks have been used in health science education for a wide range of purposes. Most of the publications were descriptive studies, while fewer correlated with learning and achievement outcomes. Providing personality frameworks as a way to develop and improve self-awareness in students is underutilized and remains unexplored.

REFERENCES

1. Accreditation Council for Pharmacy Education. Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree. February 2015. <https://www.acpe-accredit.org/pharmd-program-accreditation/>. Accessed August 12, 2020.

2. Liaison Committee on Medical Education. Functions and structure of a medical school: Standards for accreditation of medical education programs leading to the MD degree. March 2019. <http://lcme.org/publications/#Standards>. Accessed August 12, 2020.
3. American Association of Colleges of Nursing. The essentials of baccalaureate education for professional nursing practice. October 2008. <http://www.aacnursing.org/portals/42/publications/baccessentials08.pdf>. Accessed August 12, 2020.
4. Cattell RB, Warburton FW. *Objective Personality and Motivation Tests: A Theoretical Introduction and Practical Compendium*. Champaign, IL: University of Illinois Press; 1967.
5. McCrae RR, John OP. An introduction to the five-factor model and its applications. *J Pers*. 1992;60(2):175-215.
6. The Myers & Briggs Foundation. MBTI Type at Work. <https://www.myersbriggs.org/type-use-for-everyday-life/mbti-type-at-work/>. Accessed August 12, 2020.
7. Digman JM. Personality structure: emergence of the five-factor model. *Annu Rev Psychol*. 1990;41:417-440.
8. The Myers & Briggs Foundation. MBTI Basics. <https://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/home.htm?bhcp=1>. Accessed August 12, 2020.
9. Epstein S. The implications of cognitive-experiential self-theory for research in social psychology and personality. *J Theory Soc Behav*. 1985;15(3):283-310.
10. Gallup. StrengthsQuest. <https://www.gallup.com/press/176369/strengthsquest.aspx>. Accessed August 12, 2020.
11. Moher D, Liberati A, Tetzlaff J, Altman DG. The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6(7):e1000097.
12. Byrne N. The personality of past, present, and future speech-language pathology students. *Int J Lang Commun Disord*. 2018;53(2):228-236.
13. Dunne K, Moffett J, Loughran ST, et al. Evaluation of a coaching workshop for the management of veterinary nursing students' OSCE-associated test anxiety. *Ir Vet J*. 2018;71:15.
14. Grapczynski CA, Beasley J. Occupational therapy admissions: professionalization and personality. *J Allied Health*. 2013;42(2):112-119.
15. Lim CC, Schulhofer-Wohl S, Root Kustritz MV, et al. Financial expectations of first-year veterinary students. *J Am Vet Med Assoc*. 2015;247:196-203.
16. Bloom TJ. Comparison of StrengthsQuest signature themes in student pharmacists and other health care profession students. *Am J Pharm Educ*. 2018;82(1):Article 6142.
17. Van Fenema EM, Van Geel CCJ. Mental problems among first-year conservatory students compared with medical students. *Med Probl Perform Art*. 2014;29(2):113-114.
18. Avrech Bar M, Katz Leurer M, Warshawski S, et al. The role of personal resilience and personality traits of healthcare students on their attitudes towards interprofessional collaboration. *Nurse Educ Today*. 2018;61:36-42.
19. Stratton TD, Elam CL. A holistic review of the medical school admission process: examining correlates of academic underperformance. *Med Educ Online*. 2014;19:22919.
20. Walldorf J, Fischer MR. Risk factors for a delay in medical education: results of an online survey among four German medical schools. *Med Teach*. 2018;40(1):86-90.
21. Allroggen M, Kleinrahm R, Rau TAD, et al. Nonsuicidal self-injury and its relation to personality traits in medical students. *J Nerv Ment Dis*. 2014;202:300-304.
22. Costa P, Magalhaes, Costa MJ. A latent growth model suggests that empathy of medical students does not decline over time. *Adv Health Sci Educ*. 2013;18:509-522.
23. Sobowale K, Ham SA, Curlin FA, et al. Personality traits are associated with academic achievement in medical school: a nationally representative study. *Acad Psychiatry*. 2018;42:338-345.
24. Oka H, Ishida Y, Hong G. Study of factors related to the attitudes toward studying abroad among preclinical/clinical undergraduate dental students at three dental schools in Japan. *Clin Exp Dent Res*. 2018;4:119-124.
25. Gavrilesco I-M, Dondas C, Munteanu C, et al. Psychological profile of freshman pharmacy students. *Rev Med Chir Soc Med Nat*. 2017;121(4):770-778.
26. Persky AM, Mierzwa H. Factors affecting student time to examination completion. *Am J Pharm Educ*. 2018;82(7):Article 6321.
27. Jocham A, Kriston L, Berberat PO, et al. How do medical students engaging in elective courses on acupuncture and homeopathy differ from unselected students? a survey. *BMC Complement Altern Med*. 2017;17:148.
28. Jones MP, Eley D, Lampe L, et al. Role of personality in medical students' initial intention to become rural doctors. *Aust J Rural Health*. 2013;21:80-89.
29. Preece RA, Cope AC. Are surgeons born or made? a comparison of personality traits and learning styles between surgical trainees and medical students. *J Surg Educ*. 2016;73(5):768-773.
30. Yusof ZYM, Hassan WNW, Razak IA, et al. Personality traits and stress levels among senior dental students: evidence from Malaysia and Singapore. *Southeast Asian J Trop Med Public Health*. 2016;47(6):1353-1365.
31. Lourinho I, Ferreira MA, Severo M. Personality and achievement along medical training: evidence from a cross-lagged analysis. *PLoS One*. 2012(10):e0185860.
32. Bob MH, Popescu CA, Suci SM, et al. First year medical students' attitude toward anatomical corpse dissection and its relationship with their personality. *Rom J Morphol Embryol*. 2015;56(1):321-324.
33. Kulkarni NS. Evaluation of personality type of first year medical students. *J Evol Med Dent Sci*. 2015;4(48):8283-8287.
34. Bughi SA, Lie DA, Zia SK, et al. Using a personality inventory to identify risk of distress and burnout among early stage medical students. *Educ Health*. 2017;30:26-30.
35. Li Y-S, Yu W-P, Liu C-F, et al. An exploratory study of the relationship between learning styles and academic performance among students in different nursing programs. *Contemp Nurse*. 2014;48(2):229-239.
36. Waite R, McKinney N. Knowing your preference: the nexus of personality and leadership. *Creat Nurs*. 2015;21(3):172-178.
37. McLaughlin JE, Cox WC, Williams CR, et al. Rational and experiential decision-making preferences of third-year student pharmacists. *Am J Pharm Educ*. 2014;78(6):Article 120.
38. Burbach BE, Barnason S, Hertzog M. Preferred thinking style, symptom recognition, and response by nursing students during simulation. *West J Nurs Res*. 2015;37(12):1563-1580.
39. Janke KK, Farris KB, Kelley KA, et al. StrengthsFinder signature themes in doctor of pharmacy students in five midwestern pharmacy schools. *Am J Pharm Educ*. 2015;79(4):Article 49.
40. Yee GC, Janke KK, Fuller PD, et al. StrengthsFinder signature themes of talent in pharmacy residents at four Midwestern pharmacy schools. *Curr Pharm Teach Learn*. 2018;10:61-65.

41. Carter FA, Bell CJ, Ali AN, et al. Predictors of psychological resilience amongst medical students following major earthquakes. *N Z Med J*. 2016;129(1434):17-22.
42. Lee SJ, Choi YJ, Chae H. The effects of personality traits on academic burnout in Korean medical students. *Integr Med Res*. 2017;6:207-213.
43. Hojat M, Vergare M, Isenberg G, et al. Underlying construct of empathy, optimism, and burnout in medical students. *Int J Med Educ*. 2015;6:12-16.
44. Hojat M, Michalec B, Veloski JJ, et al. Can empathy, other personality attributes, and level of positive social influence in medical school identify potential leaders in medicine? *Acad Med*. 2015;90:505-510.
45. Eley DS, Brooks KD, Zink T, et al. Toward a global understanding of students who participate in rural primary care longitudinal integrated clerkships: Considering personality across 2 continents. *J Rural Health*. 2014;30:164-174.
46. Pawelczyk AM, Kotlicka-Antczak MZ, Chmielinska A, et al. Temperament traits and preferences for surgical or nonsurgical specialties in year 6 medical students. *Teach Learn Med*. 2014;26(4):387-392.
47. Lee SJ, Cloninger CR, Chae H. Cloninger's temperament and character traits in medical students of Korea with problem eating behaviors. *Compr Psychiatry*. 2015;59:98-106.
48. Muscatello MA, Bruno A, Genovese G, et al. Personality traits predict a medical student preference to pursue a career in surgery. *Educ Health (Abingdon)*. 2017;30(3):211.
49. Pitt V, Powis D, Levett-Jones T, et al. Nursing students' personal qualities: a descriptive study. *Nurse Educ Today*. 2014;34:1196-1200.
50. Bullis RC. The NFP Strategic Leader. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a514739.pdf>. Accessed August 12, 2020.
51. Arguedas M, Daradoumis T, Xhafa F. Analyzing how emotion awareness influences students' motivation, engagement, self-regulation, and learning outcome. *Educ Techno Soc*. 2016;19(2):87-103.
52. George B. *True North: Discover Your Authentic Leadership*. San Francisco, CA: Jossey Bass; 2007.
53. Everything DISC. <https://www.everythingdisc.com/Home.aspx>. Accessed August 12, 2020.
54. 16 Personalities. <https://www.16personalities.com/>. Accessed August 12, 2020.
55. Palmer H. *The Enneagram: Understanding Yourself and Others in Your Life*. San Francisco, CA; HarperOne; 1991.
56. Rubin G. *The Four Tendencies: The Indispensable Personality Profiles that Reveal How to Make Your Life Better (And Other People's Lives Better, Too)*. New York, NY; Harmony Books; 2017.
57. Maxwell WD, Grant AD, Fabel PH, et al. Impact of the Birkman Method Assessment on pharmacy student self-confidence, self-perceptions, and self-awareness. *Am J Pharm Educ*. 2016;80(9):Article 148.
58. Medina MS, Plaza CM, Stowe CD, et al. Center for the Advancement of Pharmacy Education 2013 Educational Outcomes. *Am J Pharm Educ*. 2013;77(8):Article 162.
59. Rode J, Brown K. Emotional intelligence relates to NCLEX and standardized readiness test: a pilot study. *Nurse Educ*. 2019;44(3):154-215.
60. Chapin K. The effect of emotional intelligence on student success. *J Adult Educ*. 2015;44(1):25-31.
61. Jessee S, O'Neill P, Dosch R. Matching student personality types and learning preferences to teaching methodologies. *J Dent Educ*. 2006;70(6):644-51.
62. Ware KB. Relationships between Myers-Briggs Type Indicators and NAPLEX performances. *Am J Pharm Educ*. 2019;83(1):Article 6787.
63. Law EH, Jiang R, Kaczynski A, et al. The role of personality in treatment-related outcome preferences among future pharmacists. *Am J Pharm Educ*. 2019;83(7):Article 6891.
64. Davoudi F, Esmaeeli S, AhmadzadAsl M, et al. Academic performance in Iranian medical students during the pre-clinical stage. *Med J Islam Repub Iran*. 2017;24(31):14.
65. Ferguson E, Semper H, Yates J, et al. The 'dark side' and 'bright side' of personality: when too much conscientiousness and too little anxiety are detrimental with respect to the acquisition of medical knowledge and skill. *PLoS One*. 2014;9(2):e88606.
66. Finn GM, Walker SJ, Carter M, et al. Exploring relationships between personality and anatomy performance. *Anat Sci Educ*. 2015;8:547-554.
67. Hemyari C, Zomorodian K, Ahrari I, et al. The mutual impact of personality traits on seating preference and educational achievement. *Eur J Psychol Educ*. 2013;28:863-877.
68. Kotter T, Tautphaus Y, Scherer M, et al. Health-promoting factors in medical students and students of science, technology, engineering, and mathematics: design and baseline results of a comparative longitudinal study. *BMC Med Educ*. 2014;14:134.
69. Kwon OY, Park SY. Specialty choice preference of medical students according to personality traits by Five-Factor Model. *Korean J Med Educ*. 2016;28(1):95-102.
70. Lydon S, O'Connor P, McVeigh T, et al. Medical specialty choice: does personality matter? *Ir Med J*. 2015;108(3):75-78.
71. Plaisant O, Stephens S, Apaydin N, et al. Medical students' attitudes towards science and gross anatomy, and the relationship to personality. *J Anat*. 2014;224:261-269.
72. Schreckenbach T, Ochsendorf F, Sterz J, et al. Emotion recognition and extraversion of medical students interact to predict their empathic communication perceived by simulated patients. *BMC Med Educ*. 2018;18:237.
73. Seeliger H, Harendza S. Is perfect good? Dimensions of perfectionism in newly admitted medical students. *BMC Med Educ*. 2017;17:206.
74. Shi M, Liu L, Wang ZY, et al. The mediating role of resilience in the relationship between big five personality and anxiety among Chinese medical students: a cross-sectional study. *PLoS One*. 2015;10(3):e0119916.
75. Song Y, Shi M. Associations between empathy and big five personality traits among Chinese undergraduate medical students. *PLoS One*. 2017;12(2):e0171665.
76. Tsou K-I, Lin C-S, Cho S-L, et al. Using personal qualities assessment to measure the moral orientation and personal qualities of medical students in a non-western culture. *Eval Health Prof*. 2012;36(2):174-190.
77. Stacey DG, Kurunathan TM. Noncognitive indicators as critical predictors of students' performance in dental school. *J Dent Educ*. 2015;79(12):1402-1410.
78. Hur Y, Cho AR, Kim S. How to provide tailored career coaching for medical students. *Korean J Med Educ*. 2015;27(1):45-50.
79. Yang C, Richard G, Durkin M. The association between Myers-Briggs Type Indicator and psychiatry as the specialty choice. *Int J Med Educ*. 2016;7:48-51.
80. Hunter EH. An examination of how gender may relate to communication styles of introversion and extroversion in nursing students. *Nurs Educ Perspect*. 2018;39(4):233-234.

81. Eksteen MJ, Basson MJ. Discovering the value of personality types in communication training for pharmacy students. *Afr J Health Professions Educ.* 2015;7(1):43-46.
82. Persky AM, Henry T, Campbell A. An exploratory analysis of personality, attitudes, and study skills on the learning curve within a team-based learning environment. *Am J Pharm Educ.* 2015;79(2):Article 20.
83. Ihm J-J, An S-Y, Seo D-G. Do dental students' personality types and group dynamics affect their performance in problem-based learning? *J Dent Educ.* 2017;81(6):744-751.
84. Von Bergmann H, Dalrymple KR, Schuler CF. Personality preference distribution of dental students admitted to one dental school using different selection methods. *J Dent Educ.* 2014;78(4):580-588.
85. Carter FA, Bell CJ, Ali AN, et al. The impact of major earthquakes on the psychological functioning of medical students: A Christchurch, New Zealand study. *N Z Med J.* 2014;127(1398):54-66.
86. Fang TJ, Lii SC. Relationship between personality traits and choosing a medical specialty. *J Formos Med Assoc.* 2015;114(11):1116-1121.
87. Hojat M, Erdmann JB, Gonnella JS. Personality assessments and outcomes in medical education and the practice of medicine: AMEE guide no. 79. *Med Teach.* 2013;35(7):e1267-e1301.
88. Leombruni P, Miniotti M, Zizzi F, et al. Attitudes of medical students toward the care of the dying in relation to personality traits: harm avoidance and self-directedness make a difference. *Am J Hosp Palliat Care.* 2015;32(8):824-828.
89. Leombruni P, Miniotti M, Torta RG. Personality and attitudes towards dying patients: an Italian pilot study among medical students. *Med Teach.* 2013;35(9):790.
90. Mehmood SI, Khan MA, Walsh KM, et al. Personality types and specialist choices in medical students. *Med Teach.* 2013;35(1):63-68.
91. Mokros L, Witusik A, Michalska J, et al. Sleep quality, chronotype, temperament and bipolar features as predictors of depressive symptoms among medical students. *Chronobiol Int.* 2017;34(6):708-720.
92. Nedjat S, Bore M, Majdzadeh R, et al. Comparing the cognitive, personality, and moral characteristics of high school and graduate medical entrants to the Tehran University of Medical Sciences in Iran. *Med Teach.* 2013;35(12):e1632-e1637.
93. Schuttpelz-Brauns K, Obertake U, Kaden J, et al. Association between students' personality traits and hand hygiene compliance during objective standardized clinical examinations. *J Hosp Infect.* 2015;89:210-214.
94. Chambers DW, LaBarre EE. The effects of student self-assessment on learning in removable prosthodontics laboratory. *J Dent Educ.* 2014;78(5):668-680.
95. Abe K, Niwa M, Fujisaki K, et al. Associations between emotional intelligence, empathy, and personality in Japanese medical students. *BMC Med Educ.* 2018;18:47.

Appendix 1. Sample PubMed Search String

(Personality Assessment"[MeSH] OR "Personality Assessment"[tiab] OR "personality-assessment"[tiab] OR "personality assessment inventory"[tiab] OR "personality inventory"[tiab] OR "personality questionnaire"[tiab] OR "Myers-Briggs"[tiab] OR "Rorschach Test"[tiab] OR "Rorschach Test"[MeSH] OR "personality test"[tiab]"Personality Assessment"[tiab] OR "personality-assessment"[tiab] OR "personality assessment inventory"[tiab] OR "personality inventory"[tiab] OR "personality questionnaire"[tiab] OR "Myers-Briggs"[tiab] OR "Rorschach Test"[tiab] OR "personality test"[tiab] OR "Kolb learning style inventory"[tiab] OR "Kolb learning style questionnaire"[tiab] OR "VARK"[tiab] OR "VARK questionnaire"[tiab] OR "Big 5"[tiab] OR "Big Five"[tiab] OR "Big Five Personality Test"[tiab] OR "Advanced Multi-Dimensional Personality Matrix"[tiab] OR "Advanced Multi-Dimensional Personality Matrix Abridged"[tiab] OR "REI-40"[tiab] OR "Rational-Experiential Inventory – revised"[tiab] OR "Rational-Experiential Inventory-40"[tiab] OR "personality interaction laboratory study"[tiab] OR "H-PILS"[tiab] OR "Health Professionals Inventory of Learning Styles"[tiab] OR "StrengthsFinder"[tiab]) AND ("medical education"[tiab] OR "medical student"[tiab] OR "pharmacy education"[tiab] OR "pharmacy student"[tiab] OR "dental education"[tiab] OR "dental student"[tiab] OR "nursing education"[tiab] OR "nursing student"[tiab] OR "veterinary medicine education"[tiab] OR "veterinary student"[tiab] OR "physician assistant education"[tiab] OR "physician assistant student"[tiab] OR "occupational therapy student"[tiab] OR "occupational therapy education"[tiab] OR "physical therapy student"[tiab] OR "physical therapy education"[tiab] OR "dietetics education"[tiab] OR "dietetics student"[tiab] OR "speech language pathology education"[tiab] OR "speech-language pathology education"[tiab] OR "speech-language pathology student"[tiab] OR "allied health education"[tiab] OR "allied health student"[tiab])) OR ((OR ("Students, Medical"[MeSH] OR "Students, Nursing"[MeSH] OR "Students, Pharmacy"[MeSH] OR "Physician Assistants/education"[MeSH] OR "Occupational Therapists/education"[MeSH] OR "Physical Therapists/education"[MeSH] OR "Veterinary Medicine"[MeSH] OR "Allied Health Personnel/education"[MeSH] OR "Interdisciplinary Communication"[MeSH] OR "Interprofessional Relations"[MeSH] OR "Public Health Administration/education"[MeSH] OR "Health Services Administration/education"[MeSH] OR ("Speech-Language Pathology/education"[MeSH])).