

**LOOKING UPSTREAM: EXPLORING DOCTOR OF PHYSICAL  
THERAPY STUDENTS' PERCEIVED COMPETENCE  
IN ADDRESSING SOCIAL AND STRUCTURAL  
DETERMINANTS OF HEALTH**

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## **ABSTRACT**

This study explored doctor of physical therapy (DPT) students' attitudes, perceived knowledge, and perceived competence specific to social and structural determinants of health (SDOH). Current students in a DPT program housed within a college of public health in an urban research institution served as the participants for this research. The primary purpose of this study was to explore students' self-evaluation and perceptions of competence with SDOH in hopes of gaining insight into elements of their education that contributed to their preparedness and/or what strategies and resources are needed to foster competence in this area. A secondary aim of this study was to explore how individual student factors and curricular factors impact students' awareness of SDOH.

A mixed methods study design employed bivariate and multivariate analysis of participants' responses to self-report Likert scale survey questions and analysis of semi-structured interviews using qualitative description and phenomenological principles. Quantitative data analysis revealed differences in perceived skills competence based on cohort (year one, two, or three in the program) with first-year students demonstrating lower perceived competence. Analysis of attitudes and knowledge demonstrated that all participants held a positive perspective regarding the importance of SDOH as well as perceived foundational knowledge for this content. Quantitative analysis also detected subtle differences in specific sample beliefs and behaviors based on demographic variables such as gender identity, race, and first-generation student status.

Qualitative data supported the quantitative findings with participants articulating specific elements of their identities and the DPT curriculum that contributed to their

understanding of SDOH. An iterative coding process identified two primary themes that corresponded to the research aims: 1) Learners' perceived importance of social and structural determinants of health and factors that impact how to address them; and 2) Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum. These findings shed light on the elements of this educational program that foster students' understanding of SDOH and the types of experiences that help clinical learners appreciate the impact of these upstream drivers of health for patients and populations.

This work is dedicated to my students and my patients. I am the teacher and clinician that I am today thanks to their willingness to share experiences and lessons with me. I am sure I have gained more from them than they have gained from me.

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# CHAPTER 1

## INTRODUCTION

Mr. Jones (a pseudonym) had been admitted to the hospital for management of congestive heart failure. I had been consulted as a member of the rehabilitation medicine department to perform a functional evaluation to determine Mr. Jones' mobility needs and hospital discharge recommendations. This was a complex, but unfortunately common, clinical scenario for me after roughly five years of clinical practice (at the time), much of which working with individuals with chronic and complex medical conditions. As I entered Mr. Jones' room, I introduced myself as his physical therapist and informed him that I would be helping him to stand and walk and identifying what he might need after his hospital stay. Mr. Jones responded harshly that I was "apparently here to tell [him] what to do." His tone made me pause. I asked him with sincerity what he needed and wanted to be able to return home. My eye contact with my client and his perception of my genuine concern for his well-being opened a figurative door between us. Mr. Jones identified himself as an "elderly Black man" and asked me if I had any idea what his life had entailed. I responded that I could not fathom the joys, challenges, and experiences of his life, but that I was willing to listen and learn.

Providing meaningful intervention for Mr. Jones demanded that I consider more than his medical diagnosis. This man was not merely someone undergoing medical care for progression of a chronic condition. He had a history and a lifetime of experiences that would inform how I could best help him to navigate his literal and figurative next steps. After a lengthy conversation and evaluation, I learned that Mr. Jones was a community advocate who still lived and worked in the neighborhood where he had been born and

raised – a neighborhood with a life expectancy twenty years less than the surrounding zip codes (Philadelphia Department of Health, 2020). He served as a mentor and youth sports coach for much of his life and had also faced bias, judgement, and discrimination in school, work, and healthcare settings because of his racial identity. He had sworn off doctors and a health care system that he felt had mistreated and dismissed his Black community.

Unfortunately, Mr. Jones’ sentiments are not merely anecdotal evidence. Paradies et al. (2015) documents the negative impacts of racism on health outcomes in their systematic review of 293 studies published since 1983. While the authors’ review draws a robust connection between racism and its specific effect on mental health, the impact of mental health and stress on chronic health conditions and systemic inflammation is well-documented (Tawakol et al., 2017). Recent guidance from the Association of American Medical Colleges further articulates these “upstream” social and structural drivers of “downstream” medical conditions (AAMC, 2022).

Additional literature demonstrates increased levels of mistrust for the medical community among Black and Hispanic men compared with Whites, and social factors, systemic racism, and segregation influence this trend (Armstrong, et al., 2007). A need for more cultural awareness on the part of a predominantly White health-care workforce along with the limited connectivity and cultural congruence between practitioners and communities of color perpetuates health disparities (Cuellar et al., 2020). The biomedical model of medicine, which targets its lens on pathophysiological and pathoanatomical causes of disease, is inadequate to address these challenges.

Mr. Jones had faced a lifetime of discrimination as a member of a minority community, and in this moment, I, a White woman, was entering his hospital room at one of his greatest moments of vulnerability to tell him what he should be doing. I was another example of a White practitioner imposing my narrow knowledge of disease upon his experience as a Black man. My ability to recognize and empathize with the gravity of this situation and respond to and respect Mr. Jones' perspective allowed me to connect with my client as described by Nicholls et al. (2016). We collaboratively problem-solved what he needed to return home safely and maintain a quality of life for his remaining days. While my knowledge of congestive heart failure was necessary to understand his medical condition and prognosis, my ability to listen to this man's current needs and social factors carried far greater impact for his functional outcome and ability to return home with his family.

Extant literature points to the urgency for building a healthcare workforce that more accurately resembles the populations that it serves; however, the complexities and access barriers contributing to the current Whiteness of allied health professions, such as physical therapy, occupational therapy, and speech language pathology, are beyond the scope of this dissertation. Building a diverse workforce is a longer-term challenge and necessity, yet the difficulties described by Mr. Jones demand immediate attention. Increasing current health professionals' awareness of the social and structural determinants of health may foster a needed holistic and equitable approach to health care in the short term.

I met Mr. Jones over ten years ago. I have spent the years since that encounter reflecting on the numerous factors that contributed to his circumstances. Doobay-Persaud

et al. (2019) added to a growing body of literature documenting disparities in health outcomes and the increasingly negative consequences for marginalized and underserved populations. The authors' scoping review disclosed the dearth of guidance on training health professionals to address social determinants of health (SDOH). My own early training and clinical experiences, which focused on the biomedical understanding of diseases and their treatment, did not emphasize the contribution of upstream factors to health and illness. Mr. Jones needed more than the biomedical perspective. He needed me to understand the circumstances that contributed to his health condition and why he held a distrust for the healthcare system, and he needed me to identify strategies to enable him to be home with his family and engaged in his community. Mr. Jones needed me to understand the social and structural factors that comprised his health and wellness and brainstorm how to best leverage resources to help him at that point of his life.

### **Statement of the Problem**

The Robert Wood Johnson Foundation (RWJF) states that “good health begins where we live, learn, work, and play” (RWJF, n.d., para. 1). A major concern is that access to resources for health are inequitably distributed across communities. Health disparities are a direct result of various social, structural, and systemic factors, which include behaviors, education, governmental policies, and “intergenerational transfer of health” (Magnusson & Rethorn, 2022, p. 4). When chronic, infectious, and non-communicable diseases disproportionately burden specific communities, the sources of disease burden warrant at least as much attention as the downstream medical management of those diseases.

Holt-Lunstad et al. (2010) conducted a meta-analysis on studies evaluating the impact of social factors on mortality. The authors found that social supports, defined as the “real or perceived availability of social resources” (Holt-Lunstad et al., 2010, p. 2), accounted for overall mortality with comparable effect sizes as other known risk factors, such as smoking and obesity. Additionally, the analysis concluded “that individuals with adequate social relationships have a 50% greater likelihood of survival compared to those with poor or insufficient social relationships” (Holt-Lunstad et al., 2010, p. 14). Ten years after the Holt-Lunstad et al. (2010) study, the COVID-19 pandemic forced social isolation while it simultaneously highlighted the healthcare inequities and social disparities that pervade U.S. society. While social factors tend to be associated with the individual, structural and systemic factors encompass more upstream policies and governmental processes that lead to inequity for communities and populations (Illinois Department of Health, n.d.). These issues demand consideration of how health and wellness and health disparities are taught within health professions curricula.

Current biomedical-focused curricular models in health professions training programs need review, and perhaps reimagination, to better address the complex social and structural factors that determine health and wellness for populations. While the biomedical model remains essential for understanding the pathophysiology of disease, this lens fails to address the impact of social factors on disease development and patient outcomes. Additionally, rising acuity and complexity of health conditions and documented health disparities across marginalized groups of people suggest that current health professions training practices may not be meeting community needs (Crear-Perry et al., 2021; Jackson & Gracia, 2014; Wilbur et al., 2020). Health professions students’

ability to serve diverse populations is an essential component of competence in clinical practice. Health care professionals have a responsibility to adapt to the individuals, populations, and the changing dynamics of the health care landscape, and this expectation may be daunting for students and novice clinicians. The question arises regarding how to best train health professions students to meet these expectations.

Multiple training strategies and assessment methods exist to document students' and new graduates' ability to address these evolving clinical needs. Clinical simulation, didactic content delivery, written exams, psychomotor skills practice, and experiential service-learning are common teaching tools to prepare students for the clinical components of health professions curricula. These teaching strategies capture tangible knowledge and skill performance, but documenting a students' ability to address social and structural determinants of health remains elusive. This "gray" area of clinical skill is emerging as an essential element for competence and impactful clinical care.

Competency-based education is one approach gaining traction among allied health education researchers, and it offers a means for standardizing student readiness for clinical practice across many domains. Competencies are attributes of learners that reflect knowledge, skills, attitudes, and professional behaviors that must be established to transition from didactic to clinical training portions of health professions curricula (Timmerberg et al., 2019). Many health professions' accrediting bodies require documentation of a student's clinical competence as a graduation requirement, but existing competencies may not adequately capture students' ability to address the complexity of social and structural contributions to health outcomes.

Various expectations and definitions of student readiness for clinical practice from the perspectives of academic faculty, clinical faculty, and students also create challenges for determining the effectiveness of educational methods. While academic competencies offer guidance based on consensus of various experts, assessment methods are often subjective and situational. Assessment methods may need to be setting-specific (Torres-Narváez et al., 2018), further complicating the delineation of clinical readiness and competence. Additionally, clinical populations are evolving in terms of acuity and complexity, and health disparities pose clinical challenges that may not be adequately addressed through current competency-based models.

Much of the existing literature in physical therapy education aims to define student readiness in terms of readiness for the first full-time clinical education experience. The end goal of this training is to produce clinicians capable of meeting the evolving needs of society, but research on the effectiveness of new graduate's ability to meet societal needs is sparse. Dean et al. (2019) advocated for competencies focused on health protection and health promotion for entry-level clinicians. With their focus on knowledge and competency around behavior change theory, the authors did not directly account for how to address the many life circumstances that are not a choice. The limited guidance on competencies related to SDOH highlights an opportunity to explore how students and new graduates perceive their preparedness or competence to address these complex factors.

Recent literature by Magnusson et al. (2020) and Rethorn et al. (2021) advocated for competencies pertaining to population health, prevention, health promotion and wellness (PHPW) within Doctor of Physical Therapy (DPT) programs. The authors

pursued expert consensus to develop PHPW competencies (Magnusson et al., 2020), but additional research found that content and concepts specific to PHPW may not be implemented consistently by DPT programs (Rethorn et al., 2021), thus leaving students and new graduates potentially underprepared to address key issues for patients and populations.

Beyond the traditional metrics for assessing health professions graduates' success (i.e., licensing exam pass rates, graduate program GPA, employment, etc.), additional information is needed regarding health professions students' competence for current practice, and more specifically, their preparedness or competence to address the social and structural complexities that directly impact health and wellness across populations. Mangold et al. (2022) argue that patient outcomes should serve as the benchmark for assessing impact of health professionals' training regarding SDOH, yet research is sparse regarding the connection between health professions students' training and population health outcomes.

The primary purpose of this study was to explore doctor of physical therapy students' self-evaluation and perceptions of competence specific to SDOH in hopes of gaining insight into elements of their education that contributed to that preparedness and/or what strategies and resources are needed to foster competence in this area. A secondary aim of this study was to explore how individual student factors and curricular factors impact students' awareness of social and structural determinants of health. This inquiry used *awareness* as a term to capture students' recognition or knowledge of a construct (SDOH) and *perceived skills competence* as students' perceived preparedness to address or clinically manage SDOH.

## **Research Questions**

1. How do current doctor of physical therapy students self-evaluate and perceive their preparedness (attitudes, knowledge, and skills competence) to address social and structural determinants of health (SDOH)?
2. How do personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health?
  - a. Sub question: How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?
  - b. Sub question: In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?

## **Theoretical Framework**

The population health framework (Dunn & Hayes, 1999) extends the understanding of health and wellness and health outcomes beyond the narrow focus of the biomedical model, which primarily considers the pathophysiology and the human anatomy of the individual with illness or disease. The broader population health perspective offers an upstream view of the multiple factors that contribute to patterns of illness across populations. Magnusson and Rethorn (2022) depict how social, environmental, and structural factors contribute to the concept of population health. Individual human biology interacts with behavioral determinants and social and structural determinants to produce health outcomes. The population health perspective identifies the systematic variations that exist in those outcomes. Magnusson and Rethorn (2022) also highlight the importance of “intergenerational transfer of health,” which involves the

indirect “exposure to similar social, environmental, and structural stressors in subsequent generations” (p. 4). This perspective speaks to the importance of considering more than biology or pathophysiology in disease management and health promotion and reiterates the decades long conversation that has taken place in the public health literature regarding the impact of social and structural determinants of health on general wellness.

With an eye toward serving populations, incorporation of a cultural humility framework is also invaluable for health professions training programs. Tervalon and Murray-Garcia (1998) base their advocacy for cultural humility training for physicians on the “sociocultural mismatches between patients and providers, including providers’ lack of knowledge regarding patients’ health beliefs and life experiences” (pp. 117 – 118). Whereas competence refers to a measurable endpoint or a finite outcome, humility requires continuous engagement, self-critique, and reflection (Tervalon & Murray-Garcia, 1998). Clinicians have an obligation to evaluate their own beliefs and consider the impact of their position as they navigate the client-practitioner relationship.

An additional aim of this study was to understand learners’ experience of the reflection process as they synthesized traditional curricular content with gradual exposure to the complexities and diversity of client populations. Professional growth and self-reflection require a shift in perspective from traditional competency models. Mastery is not the desired outcome, as it is not expected to master someone else’s culture. Humility is an essential piece of professional development for aspiring clinicians, and it remains uncertain how reflection skills are fostered within health professions curricula.

Extant literature on students’ limited accuracy in self-reflection raises concerns regarding effective implementation of a cultural humility framework. The Dunning-

Kruger effect (Kruger & Dunning, 1999) points out the likely bias that individuals hold in assessing their own abilities, thus overestimating their knowledge and capability at the start of their training. More recently, Gabbard et al. (2021) identified a lack of correlation between student perceptions of clinical confidence and objective measures of competence, thus providing additional support for the inaccuracy of students' self-assessments. To minimize the potential for overestimation of competence, this study included survey questions and interview prompts that identified specific clinical behaviors to foster participants' honest reflections on those behaviors.

Existing literature further justifies the need to acknowledge, label, and modify individual biases. If health professions students are educated on the likelihood of their biases, this knowledge may empower them to change, or at least recognize the limitations of their own perspective. Culturally humble clinicians successfully work with diverse clients and respect clients' beliefs and wishes. This respect for individuals and acknowledgement of cultural differences allows for creative problem-solving to mitigate illness and promote health and wellness across populations more effectively. The doctor of physical therapy program selected as the site for this study is housed within a college of public health that advocates these principles and articulates the cultural humility framework as part of its mission.

### **Definitions**

- Competencies: the characteristics of the learner that demonstrate knowledge, skills, abilities, and professional behaviors specific to a profession (Timmerberg et al., 2019).

- Entrustable Professional Activities (EPAs): “the core tasks health professionals must be competent performing prior to promotion and/or moving into unsupervised practice” (Taylor et al., 2021, p. 89).
- Population health: “As an approach, population health focuses on interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations” (Dunn & Hayes, 1999, p. S7).
- Social Determinants of Health (SDOH): “factors such as employment, housing, transportation, safety, education, food access and quality, racism and discrimination, and access to and quality of healthcare” (Mangold et al., 2022, p. 2) that influence health and health outcomes for populations.
- Structural Determinants of Health: “cultural norms, policies, institutions, and practices that define the distribution (or maldistribution) of SDOH” (Crear-Perry et al., 2021, p. 231).
- Marginalization: “the process through which persons are peripheralized based on their identities, associations, experiences, and environment” (Hall et al., 1994, p. 25).

### **Positionality Statement**

Through nearly two decades of clinical experience, I have transitioned from student to clinician to clinical specialist to clinical educator and educational researcher. My roles as an academic and clinical educator and as a practicing physical therapist afford me the unique perspective to explore the gap between academic training and

clinical practice. My clinical and academic work allows me to engage with individuals from diverse backgrounds and communities and reminds me of the narrow scope of my own lived experience. I strive to expand my understanding of communities, populations, and cultures, and I hope to foster curiosity and empathy in the next generation of health professionals. I also aim to train culturally humble clinicians with the capacity to employ critical thinking and creativity to achieve positive patient outcomes. My research interests are aimed at bridging the academic-clinical gap and helping to build an inclusive health care workforce equipped to meet the unique needs of the diverse populations it serves.

### **Methods**

The research questions were investigated through concurrent mixed methodology involving a quantitative survey and individual participant interviews. The participants for this study were students in a doctoral level physical therapy program at an urban, public, top tier research university. Doctoral level training has been the national standard entry level professional training for physical therapy for more than two decades. This setting was ideal to explore learners' perceived knowledge and competence with SDOH based on institutional and program missions to serve the community and improve the health of society. This site, its mission, and its doctor of physical therapy curriculum, which demonstrated strong community engagement, provided insight into educational strategies that foster, or potentially hinder, students' effectiveness in addressing SDOH. Students were recruited for survey participation via email listservs for each of three annual cohorts (first-, second-, and third-year students) in the doctor of physical therapy (DPT) program. Emails were distributed by the program director, which is a standard communication platform for this program. A sample of participants representing each time point

volunteered for participation in semi-structured interviews to provide context and elaboration on the student experience within the curriculum. The complete methodology for this study is detailed in Chapter Three.

A potential limitation of this study involved a self-selection sampling bias. Students with a vested interest in social determinants of health due to personal experiences and individual demographics may have felt more inclined to volunteer for this research. This possibility may have biased data toward students' seemingly strong awareness of the importance of social determinants of health. Further, surveying students across cohorts may have reflected differences among cohorts rather than changes due to progression through the curriculum. Following the COVID-19 pandemic and the necessary restructuring of education delivery methods, cohorts of students had varied learning experiences prior to matriculation into the DPT program and differing approaches to learning upon entry into the program. While multivariate analysis methods may have mitigated the influence of these differences, future research needs to explore longitudinal data to capture true impact of the curriculum. Further limitations and implications are described in detail in Chapter Five.

### **Implications and Importance**

This study offers new information regarding health professions students' perceptions of competence to address social and structural determinants of health and draws connections between student and educational characteristics and students' perceptions. This study fills a gap in the literature, which currently focuses on best educational practices but demonstrates limited exploration of students' perceptions and experiences specific to social and structural determinants of health. The following

literature review details the educational strategies currently in practice across health professions programs and methods for assessing competence throughout health professions curricula and establishes the need for more comprehensive training and assessment strategies specific to social determinants of health.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **Introduction**

Health professions students engage in academic or didactic training as well as experiential opportunities to learn how to apply foundational knowledge in real time in clinical practice. While knowledge acquisition is typically initiated through study in an academic setting, skills are refined, and knowledge is applied and expanded through experiential practice. Experiential and clinical training is thus an essential component of all health professions' curricula, and many accrediting bodies require documentation of a student's clinical competence as a graduation requirement. Implementation of experiential and clinical education varies widely across professions and training programs, thus impeding objective and standardized assessment of learners' clinical competence (Crawford et al., 2020; Danzl et al., 2019; Miller et al., 2017; Palombaro et al., 2011; Rich et al., 2020). Evolving acuity and complexity of population health needs along with a growing recognition of the influence of upstream socioeconomic and structural factors on health and wellness further complicates the delineation of what health professions students need to know to deliver effective care. Despite strong evidence that social and structural determinants of health (SDOH) play a pivotal role in health, wellness, and the development of disease (Crear-Perry et al., 2021; Hood et al., 2016), curricular content and assessment of student competence pertaining to SDOH is implemented inconsistently across programs (Mangold et al., 2022; Rethorn et al., 2022).

Medical and allied health professions have a responsibility and public expectation to address societal health needs more effectively. These expectations necessitate curricula

that adequately prepare students during their academic and clinical training. Within biomedically-focused health professions programs, academic faculty have differing perspectives on the importance of topics pertaining to public health and wellness (Rethorn et al., 2022), and these differences may lead to competing priorities for weighting content in densely packed health professions curricula. Additionally, students focus their efforts and energies toward studying and applying content that they know will be assessed and graded (Mangold et al., 2022). If content related to SDOH is not clearly communicated and consistently and objectively assessed, students may not invest the time in understanding those concepts.

### **Competing Curricular Priorities**

Management of disease, illness, and functional limitations remains a primary emphasis within medical and allied health professions training, and some health care professionals question whether the medical community is responsible for addressing the upstream factors that define SDOH (DeSalvo, 2020). As the discussion continues, public needs and expectations demand recognition and problem-solving of social and structural determinants of health. Academic training programs face a tall hurdle for preparing competent clinicians capable of meeting these needs while also delivering traditional biomedical content to effectively manage downstream medical conditions.

A parallel challenge involves facilitating the transition from classroom learning to clinic-based learning as student clinicians struggle to recall and apply curricular content. Existing strategies for establishing student readiness for the clinic include competency-based curricula, which is common in medical education, and standardized assessments of clinical skills, such as simulated practical exams and objective structured clinical

examinations, or OSCEs (Doobay-Persaud et al., 2019; Miller et al., 2017). Many health professions training programs also employ service-learning opportunities as a means of fostering and evaluating students' affective behaviors during client interactions (Danzl et al., 2019; Hayward et al., 2019; Murray, 2013), and these strategies hold promise for increasing students' awareness of social and structural determinants of health. These expectations of application of didactic knowledge along with navigation of complex and diverse clinical populations place a large cognitive load on learners.

Despite numerous educational practices and their promise for ensuring students' competence and readiness upon entering the clinical component of training, literature suggests that healthcare providers may not be meeting the needs of diverse and complex populations (Hood et al., 2016; Jackson & Gracia, 2014; Wilbur et al., 2020).

Furthermore, medical mistrust remains a prevalent concern and limits the effectiveness of health care among marginalized groups of people (Benkert et al., 2019). The data from these studies and others suggest that traditional markers of graduates' competence (i.e., clinical skills assessments, program Grade Point Average, graduation rates, licensing exam passing rates, and employment) may not translate to impactful clinical care.

Academic leadership and accrediting bodies for health professions programs are in the early stages of acknowledging this apparent discrepancy.

### **Shifting Curricular Focus**

Advocacy to better address population needs is growing across the health professions. A research team headed by Gail M. Jensen (American Physical Therapy Association, 2015) published recommendations for "excellence in physical therapist education" to address societal needs. The recommendations state the following:

Physical therapist education will prepare practitioners who can thrive in a dynamic, rapidly changing health care system that focuses on the health outcomes for individuals and populations through leveraging technology, addressing the social determinants of health, reducing costs, and improving access to care. The public's expectation for greater accountability throughout higher education will continue and will require attention to improved graduate outcomes, the value of research, the need for reduced cost of education to students and society, and acquisition of the necessary resources for the enterprise. (APTA, 2015, p. 3)

These are lofty expectations, and they speak to the importance of producing healthcare providers with the capacity to address societal needs. They also highlight the need for efficient, effective, and sustainable education practices to produce a competent workforce. Similarly, the Accreditation Council for Graduate Medical Education recommends competencies focused on SDOH to improve efficacy of care, yet implementation and assessment of these competencies is currently inconsistent across medical education programs (Gard et al., 2020).

The following sections of this chapter provide context for current definitions of clinical competence and existing strategies for assessing that competence. An overview of curricular models describes common educational methods used to prepare healthcare professions students for clinical practice. Supplementary experiential educational opportunities are frequently employed to document affective behaviors and “soft skills” that psychomotor skills assessments and traditional written examinations may not capture. The extant literature on competency models, experiential learning, and assessment strategies leaves a gap regarding whether these practices are effective in preparing students to acknowledge and address upstream health factors. A growing number of studies specifically investigate incorporation of curricular content involving social and structural determinants of health, but implementation and outcome assessments specific to SDOH are inconsistent and are often subjective and based on

learner self-report. An additional focus on patient outcomes highlights the existing gap between clinical training and accessible, equitable, and effective care and points to the need for additional research to capture patient perspectives as an indicator of effectiveness of care, and thus effectiveness of professional training.

## **Literature Review of Teaching Strategies**

### **Defining Clinical Competence**

Educators within the health professions face the complexity of defining clinical competence and identifying discipline-specific knowledge, behaviors, and skills expected of aspiring clinicians. These traits, when demonstrated by the student or novice clinician, demarcate competence within specific areas. In medical training, entrustable professional activities (EPAs) are widely utilized to identify professional benchmarks, or “the work that must be done” (ten Cate et al., 2015). These EPAs define work-specific tasks and differ from the knowledge and skills, or competencies, which are characteristics of an individual (ten Cate et al., 2015).

Taylor et al. (2021) argue that EPAs must align with the goals and skills of professional practice. Thoughtful construction of these benchmarks through expert consensus may bolster construct validity with respect to clinical practice standards (Taylor et al., 2021). With the increasing implementation of EPAs throughout medical education programs, careful construction of these descriptions as well as reliable and valid assessment methods are necessary; yet objective assessments of these professional behaviors remain variable and inconsistent (O’Dowd et al., 2019). This inconsistency poses challenges for determining whether students or residents have fulfilled the objectives.

Competency-based education (CBE), also widely used throughout medical education, may be viewed as a steppingstone to EPAs. Jensen and colleagues (2022) define CBE as “an outcomes-based approach organized around competencies derived from an analysis of societal and patient needs. It de-emphasizes time-based education and promises greater accountability, flexibility, and learner centeredness” (Jensen et al., 2022, p. 335). This definition focused on societal needs offers insight for reprioritizing curricular content. Patient and community outcomes drive the reverse design of educational strategies under this model. As with EPAs, objective documentation of CBE outcomes is currently lacking (Van Melle et al., 2021). Van Melle et al. (2021) note that extensive resources have been devoted to competency-based education without any confirmation that it works. They cite the dearth of empirical data connecting traditional measures of student competence and patient and population outcomes. Effectiveness of education strategies should not be claimed without this important connection.

Jensen et al. (2022) proactively offer a framework and explicit guidance for building the scholarship to document CBE’s impact on learners and patients. The authors introduce key research questions developed by expert consensus to shape more objective approaches to assessment of training practices. Their suggested lines of inquiry fall under specific categories, such as context (e.g., “What are the learner’s reactions to assessments in various settings?”) and implementation (e.g., “Do classroom assessment methods predict learners’ performance in the clinical setting?”) (Jensen et al., 2022, p 337). These questions encourage critical inquiry of educational practices to optimize learners’ impact in the clinic environment, and they inform the current research study regarding how

student characteristics and current educational practices impact students' awareness of and competence with SDOH.

### **Assessing Clinical Competence**

While concrete empirical data on CBE effectiveness may be an ongoing endeavor, many health professions programs have embraced the value of CBE as a strategy to prepare their students for the demands of clinical practice. Belisle et al. (2021) described CBE as a transformative style of learning in which “students are expected to develop sustainable competencies and leadership attributes in order to be effective agents for change in their future practice” (p. 2). The authors highlighted professionalization, or the development of professional identity specific to an area of health care practice, as essential to fulfilling the expectations of CBE. The authors also noted that professional competence, appropriation of professional culture, and formation of a professional identity were highly dependent on the types of learning experiences in which a student engaged.

Baig et al. (2010) concisely identified clinical competence as the “clinical skills, interpersonal aspects of patient physician encounter, and professionalism” (p. 19). While traditional assessments, such as written exams, capture didactic knowledge, the authors asserted that skills-based assessments may more accurately reflect the desired behaviors of clinical practice. Using a multimethod matrix approach, the authors used performance-based assessments, such as OSCEs, in-training evaluation reports (ITERs), clinical evaluation exercises (CEX), and structured feedback via the physician achievement report (PAR), to assess construct validity specific to clinical competence. The authors found support for reliability and validity of the selected assessment tools for measuring

clinical competence; however, they advocated for additional research with larger samples across various disciplines to validate and generalize measures of clinical competence. Their study stepped beyond the confines of measuring competencies and addressed clinical practice expectations through CEX and structured feedback. The authors provided important groundwork for defining competency and instituting reliable and valid assessment practices to affirm that measures of competency translate to effective care. The findings of Belisle et al. (2021) echoed this earlier study by Baig and colleagues (2010) by highlighting the importance of active learning, reflection, and feedback and instructional support in fostering learners' competence.

Further contributing to the support for structured feedback as a means of fostering increased clinical competence, Young et al. (2020) conducted a qualitative study to understand how a direct observation and structured feedback program (DOSFP) leads to alignment of goals for residents and faculty within a competency-based education model. Interviews were conducted with 10 resident/supervisor pairs, and findings revealed that a trusting relationship built on formative growth rather than judgement facilitated residents' authenticity in patient interactions. Young et al. (2020) offered insight into factors that contribute to perceived success of a CBE model, including intentional implementation of strategies to foster truly formative feedback, longitudinal relationships between evaluator and trainee, and alignment of purpose and goals of the program and assessment strategies. Young et al.'s (2020) work related to the current study by identifying specific curricular factors (i.e., structured feedback) that fostered competence among learners.

In line with Young et al. (2020), Rich et al. (2020) explored the implementation of a CBE model by qualitatively analyzing the perceptions of residents, faculty, and

academic advisors throughout a medical residency program. The authors cited the “two communities’ metaphor,” describing the gap between the researcher and the consumer of research who is using newly generated knowledge for decision-making and correlated this relationship between the “frontline faculty” who observe medical residents in the clinic and the “competence committee” members who make formative decisions about medical residents’ achievement (Rich et al., 2020, pp. 1092 - 1093). This study found the need for all participants to understand their roles and the source of inputs within the system. For example, academic advisors held a unique perspective to bridge communication between “frontline” or clinical faculty, residents, and competence committees. Without an understanding of how the system works, each member of the system could not effectively contribute. Rich et al. (2020) also highlighted the subjectivity and challenge of identifying student readiness for independent practice. The study participants indicated that “no one is closing the loop with residents’ personal learning plans” (Rich et al., 2020, p. 1092), and summative decisions were being made with information that was intended for residents’ formative growth. The authors advocated that a better understanding of systems thinking, in which all members were accountable for their roles and program goals, may have facilitated more meaningful feedback from supervisors and advisors and fostered greater accountability among residents for personal learning plans. The authors claimed that increased attention to intent would result in more meaningful reflection among all players and hopefully yield competent and effective physicians.

Timmerberg et al. (2019) cited the medical education model of defining EPAs as a background for their study on performance expectations for doctor of physical therapy

students entering their first full-time clinical experience. The authors employed the Delphi method, which involves recruitment of experts in a field or topic to complete multiple rounds of surveys to arrive at a consensus (Timmerberg et al., 2019). They obtained 112 responses, a 78.8% response rate, from purposive and snowball sampling of various academic and clinical participants. Through four rounds of surveys, they identified consensus of “essential knowledge, skills, attitudes, and behaviors” (Timmerberg et al., 2019, p. 132) or KSAs, expected of physical therapy students entering their first full-time clinical experience. The resulting fourteen themes aligned with clinical practice expectations, and the authors offered recommendations for assessment strategies. This study exemplified the rigor advocated by Taylor et al. (2021) for establishing consistent and specific expectations for clinical competence.

Timmerberg et al. (2019) identified an important limitation of their work in that consensus for the KSAs was established among predominantly female, White, non-Hispanic participants. The authors noted that this participant pool may not be representative of the diversity of the profession or the populations it serves. Additionally, the agreement for specific affective behaviors may not have captured the nuance of interacting with individuals from diverse cultures and backgrounds. These elements may have also neglected the varied experiences that students bring with them that may facilitate or hinder their ability to engage with various patient populations. KSAs that did not reach agreement for proficiency included “engage in shared decision-making with patients” (Timmerberg et al., 2019, p. 141) suggesting that this is a skill expected to develop throughout clinical practice rather than prior to the first full-time clinical learning experience.

As learners progress through their clinical training, how is patient engagement and shared decision-making being developed and assessed? While the health care community gains an understanding of the importance of social, systemic, and structural factors on health and wellness, it follows that clinicians in training should be expected to demonstrate knowledge and competency in these areas. The literature on the development and implementation of CBE described above suggests that some of these critical aspects of patient engagement may not have clearly defined learner outcomes. These skills remain a “gray area,” like affective behaviors, which are difficult to quantify and objectively assess.

Clinical reasoning is another aspect of clinical care that demands the application of knowledge and synthesis of many factors impacting a client or patient. Furze et al. (2015) summarize clinical reasoning as “the critical thought process and judgment behind one’s action, whereas clinical decision making is the action that is taken on this process” (Furze et al., 2015, p. 22). To understand how students develop these skills, the authors used a qualitative approach to interpret student reflections and narrative data from the Physical Therapy clinical performance instrument (CPI) collected throughout the curriculum for 98 student participants across two consecutive cohorts of Doctor of Physical Therapy students. Results indicated that beginner students lean on an internal focus and rigid reasoning, which evolved into an external, patient-centered focus with evidence of accountability and self-reflection (Furze et al., 2015). The authors noted exceptional “outlier” students that excelled in progression to reflection-in-action in their clinical decision-making.

Furze et al. (2015) captured important insights on student development within a pre-licensure curriculum. Similarly, Bramley and McKenna (2021) employed a scoping review methodology to explore the implementation of EPAs across the allied health training programs. While much of the medical education literature focuses on EPAs with post-graduate medical residents, Bramley and McKenna (2021) targeted entry-level education defined as a phase of professional competence and independence but with mentoring available, as needed. This definition captured the professional entry point for many of the health professions, such as nursing, occupational therapy, physical therapy, social work, and speech language pathology. Despite an effort to include diverse health professions, the scoping review involved studies of only pharmacy, medicine, psychiatry, and physician assistant programs. Limited documentation of EPA implementation in allied health fields spotlighted an opportunity to define professional practice expectations more clearly.

Bramley and McKenna's (2021) review identified several key uses of EPAs: to define educational outcomes and expectations, to address concerns that physicians are not entering the field as competent clinicians, and to provide more flexible timing for students to achieve outcomes. Their scoping review articulated the benefit of EPAs as an objective means for documenting student preparedness for clinical practice and for allowing students' various rates of progression. The review also drew an important link between educational practices and learner performance outcomes. Highlighting the individual nature of progression to competence, Furze et al.'s (2015) identification of outlier or exemplary students complemented summary comments from Bramley and

McKenna (2021) that students may meet objectives and achieve clinical readiness at different rates.

Educators of future clinicians must recognize this variability in time to achieve clinical competence and consider individual student factors and curricular elements that foster or hinder that progression to competence. The variability in time to achieve professional expectations is frequently noted by proponents of CBE. Learners process information at varying rates, and their prior experiences shape how they synthesize new information and educational experiences. The current study explored the impact of those individual student and curricular factors on students' attitudes, perceived knowledge, and perceived skills competence specific to social and structural determinants of health.

### **The Case for SDOH in Health Professions Curricula**

While utilizing competency-based curricula and EPAs to define specific knowledge, skills, and behaviors required for effective health care delivery, education programs must also consider meaningful strategies to encourage students' engagement with their own learning and reflection on professional growth and cultural responsiveness. Knowledge and skills competencies regarding upstream contributors to health or chronic illness and disease have not been an objective focus of health professions' training and assessment efforts until recently. The American Association of Medical Colleges recommends training in SDOH within medical education (Gard et al., 2020), yet little guidance exists regarding how to implement and assess that training (Mangold et al., 2022). With the time and financial resources devoted to health professions training on the part of students, institutions, and accrediting bodies, it is time to reimagine how students understand the root causes of disease (NASEM, 2016).

Decades of research have documented the systemic, social, and structural contributors to health and disease. A report by the National Academies of Sciences, Engineering, and Medicine (NASEM) summarized years of data and concluded that, “educating health professionals about the social determinants of health generates awareness of the potential root causes of ill health and the importance of addressing them in and with communities” (NASEM, 2016, p. 1). A more recent report by the same organization articulated the challenge and the need for the medical community to turn its focus from the downstream urgency of disease management to the upstream sources of those diseases (NASEM, 2019). Similar arguments have proliferated educational literature indicating ongoing awareness of the issue, yet minimal change has occurred in health professions educational models. The COVID-19 pandemic has brought fresh light to upstream health factors and the prevalence of health inequities and exposes the need for a healthcare workforce that is better equipped to navigate and mitigate these disparities.

The time to reimagine health professions training is long overdue. The inequitable distribution of chronic and infectious disease-burden highlights how marginalized and underserved communities suffer disproportionately poor health (Farmer, 2013). Overt disparities in health outcomes by race (Crear-Perry et al., 2021) further supports the need to reform practice and training. An overview of pivotal recent studies on this topic sheds light on the current state of training and assessment specific to SDOH.

Leaune et al. (2021) conducted a systematic review and meta-analysis to explore medical students’ attitudes toward serving underserved populations (MS-ATU). After identifying fifty-five articles, which included surveys of 109,647 medical students, the

authors affirmed previous claims that medical students' attitudes toward the underserved decline across the medical education curriculum. While many of the studies tracked cohort perceptions through curricular progression, several of the studies included in the meta-analysis assessed specific educational interventions. Traditional didactic education had limited impact on students' attitudes. The only educational strategies that appeared to positively impact MS-ATU were "global curriculum dedicated to social accountability" and "experiential community-based learning" (Leaune et al., 2021, p. 7). These potentially impactful educational experiences coupled with additional data that students' demographics (e.g., female gender and minority social identity) positively impact MS-ATU suggested a need for more targeted curricular models that foster social accountability and admissions selection practices that bring diverse perspectives to each cohort.

While the data presented by Leaune et al. (2021) identified opportunities for promoting student understanding of social determinants of health, the data failed to explain why students' attitudes toward serving the underserved declined throughout medical education. It is unclear if curricular content potentially induced bias against certain patient populations or if students gained an understanding of the challenges faced by patients and marginalized communities and felt that addressing those challenges was beyond their scope. Qualitative inquiry into students' perceptions is, therefore, essential for understanding the how and why behind the change in students' attitudes and how educational and personal experiences shape those attitudes. The present study partially filled this gap through exploration of students' perceptions.

In additional support of experiential learning, Doobay-Persaud et al. (2019) conducted a scoping review to identify current curricular strategies and assessment tools to determine the impact of medical education practices on aspiring physicians' abilities to address social determinants of health. The authors based their review on the foundational teaching principles of transformative learning, service-learning, and critical reflection. They defined transformative learning as:

A theory of learning that is beyond basic knowledge or skill acquisition whereby the learner's assumptions and perspectives are transformed via experiential learning, facilitated structured reflective dialogue, and high level analysis. These new beliefs and insights are then applied to current and future actions and critically assessed. (Doobay-Persaud et al., 2019, p. 721)

After screening 286 titles and abstracts, the authors included 22 articles for full-text review. Articles described curricular content, such as "community engagement, understanding the local context, health policy and advocacy teaching, and professional development..." (Doobay-Persaud et al., 2019, p. 723). The articles also identified experiential learning as "activities involving direct interactions with patients, families, and communities" (Doobay-Persaud et al., 2019, p. 723). Regarding assessments, the majority of included articles relied on student self-assessment of knowledge and affective traits. A small number of studies used clinical performance assessments that focused on learners' ability to communicate with clients and "validate patients' concerns" (Doobay-Persaud et al., 2019, p. 727).

With clinical expectations typically prioritized around medical management, assessment of students' ability to recognize and address SDOH was not consistently captured. Additionally, Doobay-Persaud et al. (2019) noted that assessments pertaining to students' understanding of SDOH were often subjective and reliant upon learner self-

assessment. This dearth of objective assessment strategies highlighted a need for more comprehensive and standardized assessment tools to capture learners' knowledge, skills, and attitudes around upstream factors that impact the health of patients and populations.

Molitor et al. (2021) took a major step toward objective assessment as they employed a randomized control study to assess the impact of a simulated interprofessional case study on learners' confidence in acknowledging SDOH. Learners from a variety of medical and allied health professions at two midwestern universities participated in their study. Participants were randomly assigned to one of two simulated case studies: a medically focused case (control group) and a case focused on SDOH (experimental group). The authors cited the importance of interprofessional collaboration to adequately address the numerous medical and social factors that impact health. To assess outcomes specific to interprofessional collaboration, the authors used a previously developed and validated tool, the interprofessional attitudes scale (IPAS). Based on the lack of standardized assessments regarding students' knowledge of SDOH, the authors developed their own survey tool to assess students' recognition of SDOH. All surveys were assessed pre- and post-participation in the case study activity to assess between group and pre-/post-activity differences.

While the authors found that the experimental case study more robustly enhanced learners' ability to recognize and address SDOH, both groups demonstrated an improvement in awareness of SDOH. Additionally, there were no significant differences between groups for the post-activity IPAS scores, suggesting that the case study focus or topic may have been less important than the general participation in an interprofessional learning activity. Their study was limited by a newly developed tool for assessing

students' perceptions of SDOH, which the authors noted displayed poor consistency and reliability. Despite these limitations, the authors highlighted the large sample size for this randomized controlled trial and suggested that a targeted learning activity on SDOH may improve learners' awareness of these important health factors.

Recognizing the need for competencies specific to public health and wellness, but also acknowledging the lack of existing guidance in implementation or assessment of these topics, Magnusson et al. (2020) offered invaluable direction for physical therapy education programs. The authors advocated for the role of physical therapists in evidence-based population health, prevention, health promotion, and wellness (PHPW). They used a modified Delphi study approach "to establish expert consensus in the development of entry-level PHPW competencies for graduates of U.S.-based physical therapist education programs" (Magnusson et al., 2020, p. 1646). They identified twenty-five competencies that they categorized into three domains of competence focused on health promotion: (1) "preventive services and health promotion;" (2) "foundations of population health;" and (3) "health systems and policy" (Magnusson et al., 2020, p. 1656). Beyond merely listing competencies, the authors drew explicit connections between their developed competencies and the curricular elements defined by the Commission on Accreditation in Physical Therapy Education (CAPTE, 2020).

Their work directly relates to the current study by offering a set of competencies or expectations for entry-level practitioners. These "domains of competence" shape expectations of preparedness in addressing PHPW elements. These competencies directly capture holistic and upstream health factors by advocating that learners, "Recognize individual, family, community, organizational, and societal barriers that impact

achievement of optimal health and function” and “Identify community resources and supports for priority health behaviors (active living, healthy eating, injury prevention, stress management, smoking cessation, healthy sleeping, alcohol moderation, and substance-free living)” (Magnusson et al., 2020, p. 1651). Learners’ ability to “recognize” and “identify” requires reflection on their own individual experiences and the empathy to appreciate someone else’s experiences, regardless of how similar or dissimilar those experiences may be from their own. These competencies shaped the survey that was used in the quantitative arm of this study.

### **Fostering Holistic Competence**

Beyond objective competencies or entrustable professional activities, the aspiring clinician needs to engage with clients through various forms of communication, including written, verbal, non-verbal, and electronic means. Evolving modes of health care delivery demand that health care providers implement their knowledge and skills in different settings and contexts and accommodate clients in numerous situations. Impactful health care delivery is both an art and a science. If the knowledge and skills are the science, then the empathy, reflection, and innovative decision-making are the art. With the challenges described above for defining and documenting competence in skills and abilities, identifying and quantifying less tangible behaviors remains even more elusive.

Cook et al. (2018) employed a Delphi study method to identify factors predictive of positive post professional performance, which they defined as self-efficacy, coping, and career satisfaction, among graduates of physical therapy programs. The authors found that many non-cognitive factors, such as emotional and social intelligence, leadership, community commitment, and social responsibility are exemplary of positive

post professional performance. These traits hold critical importance, especially in the wake of the COVID-19 pandemic that has exposed deeply entrenched health disparities. The consensus detailed by Cook et al. (2018) supports the need to foster these traits within entry-level clinical training. While current health professions curricula frequently include aspects of non-cognitive behavior development, formal guidance for development and assessment of these factors is lacking.

Bernal and Froman (1987) developed the cultural self-efficacy scale to explore health professionals' sense of self-efficacy and competence in addressing cultural contributions to the effectiveness of care delivery for specific populations. The authors used regression analyses for a national sample of participants and found "significant relationships between perceptions of efficacy and demographic variables of race, education, and experience" (Bernal & Froman, 1987, p. 24). This older study has been validated by more recent research that advocates for the relationship between individual characteristics and how those characteristics shape responses to learning experiences and client interactions (Belisle et al., 2021). Furthermore, Bernal and Froman (1987) advocated for four key curricular concepts that resonate today: (1) increased transcultural knowledge increases "sense of confidence in caring for culturally diverse clients" (p. 30); (2) "contact with clients from different cultural groups increases self-efficacy" (p. 30); (3) culturally diverse clinicians have increased sense of efficacy in working with clients with whom they identify, and should therefore, be recruited to work with those populations; and (4) clinicians "need to have practical experience working with clients from a variety of cultural groups" (p. 30). This study provided the guidelines to which modern health professions programs should continue to aspire.

Health professions students face sizable cognitive demand to retain a large amount of didactic information and apply it in numerous complex medical and cultural contexts. Beyond the need to recall critical information for accurate medical decisions and patient safety (the science of care), health professions students must also respond, adapt, and connect with the populations with whom they work (the art of care). Increasing complexity of health needs and diversity of patient populations demand that clinicians apply a multifactorial skill set, including knowledge, skills, and affective attributes, that support clients' health and wellness. These are lofty, but achievable goals. Numerous learning experiences to prepare students for the clinic are used across the health professions, but assessments of student and client outcomes are difficult to generalize. Service-learning opportunities and integrated clinical education are two of the strategies that may complement competency-based assessments and potentially bolster students' affective development and clinical effectiveness.

Danzl et al. (2019) described the implementation of a service-learning curriculum in a pro bono clinic housed within a doctor of physical therapy program. The authors framed this case study with literature supporting service-learning experiences as opportunities for pre-clinical students to build behaviors and professionalism that may translate to clinical practice. The authors noted the lack of confidence experienced among the first-year students as they began this integrated clinical experience prior to much of the didactic coursework. This lack of confidence transitioned to growth as indicated by one student's comment, "I believe in order to grow in this career, one must be put in situations where you feel uncomfortable or ill-prepared because it shows you how good you are at thinking on your feet, which is a large part of being a physical therapist"

(Danzl et al., 2019, p. 304). This study complemented the findings by Furze et al. (2015) that students evolve throughout their training. Providing meaningful learning experiences allowed students to develop empathy and appreciate the direct application of didactic knowledge to clinical practice.

Noonan et al. (2020) expanded on the idea of student readiness for clinical practice and addressed exposure to diverse populations through their assessment of students working at a pro bono clinic catering to rural migrant farmworkers. Methods involved open ended survey questions distributed to doctor of physical therapy students who had participated in a pro clinic serving rural migrant farm workers. Survey responses were coded via thematic analysis. The student participants in this study indicated an increased appreciation for the “Diversity of Rural Communities” following their experience in the pro bono clinic, as indicated by one student’s comment, “[this experience] increased my cultural awareness and how different lives can be for someone that is living a few miles away” (Noonan et al., 2020, p. 52). In the effort to meet community needs, raising students’ awareness of the diversity of communities may have facilitated a more holistic approach to care, greater empathy, and improved problem-solving in settings with limited resources. These findings supported earlier results reported by Bernal and Froman (1987) that advocated for health professions students’ exposure to diverse populations to improve sense of efficacy.

The idea of a pro bono clinic as a means of student development and fulfillment of community needs is discussed by Palombaro et al. (2011). The authors articulated a model for the development and implementation of pro bono services to foster physical therapy students’ leadership and responsibility and psychomotor skills set while also

serving a community need. This relationship between a health professions program and the surrounding neighborhood supported access to care and fostered cognitive and affective development for student clinicians. Additional studies on experiential and pro bono clinic experiences have advocated for these strategies to promote students' clinical readiness and efficacy (Gilles et al., 2019; Porretta et al., 2017). While research supports implementation of experiential and community-based learning for health professions students, direct assessment of students' perceived competence with respect to social and structural determinants of health is lacking. Opportunities exist to empirically evaluate this important aspect of clinical care.

### **Patient Outcomes: The Elusive End Goal**

Citing the current lack of guidance in the literature on health professions students' ability to address social and structural determinants of health, Mangold et al. (2022) utilized the Delphi method to formulate guidelines and recommendations for assessing students on their knowledge of SDOH. The authors provided five recommendations including assessing students' "attitudes about how the SDOH impact health outcomes and contribute to health inequities... and appreciat[ion of] the interaction between an individual and population health" (Mangold et al., 2022, p. 6). These recommendations highlighted the importance of patient and population outcomes rather than mere documentation of competency. Another key recommendation from this consensus was that assessments should be completed by students (self-assessment), faculty, and most importantly, patients. The authors articulated the challenge for students to organize and synthesize seemingly infinite content within medical training and argued that "patient-

centered outcomes and quality of care” (Mangold et al., 2022, p. 7) must be prioritized as an indicator of students’ performance.

Stickler et al. (2016) provided one of few empirical examples connecting students’ clinical skills with patient outcomes. The authors explored quality of life and pain scale measures for clients receiving care within a university affiliated pro bono physical therapy clinic. Aside from gender, age, and employment status, additional patient demographic data was not collected in this study. 75% of the 28 patient participants reported being unemployed, which may have corresponded to limited access to health insurance and health care. While the authors reported significant improvements in quality of life and pain measures, they also noted that no change was detected in comorbid factors, such as high blood pressure. A short duration of treatment may have limited impact on holistic health factors that would be better managed through a longer-term cardiovascular conditioning program (Stickler et al., 2016). Additionally, the authors reported that patient satisfaction was not assessed. This study offered documentation of the effectiveness of students’ clinical skills in managing functional impairments and pain, but student learning and perceptions and patient satisfaction were not captured.

Questions pertaining to students’ ability to manage holistic health indicators and outcomes remain unanswered. Despite extensive efforts to improve the training of health care providers, inequities in healthcare hinder the desired health and well-being for marginalized communities. One of the many contributing factors to this healthcare gap is a mismatch between a predominantly White healthcare workforce and a diverse general population. While diversity in the health professions is beyond the scope of this literature

review and study, building an empathetic workforce capable of recognizing disparities and offering holistic care must be a primary objective for training programs. Extant literature suggests that the health professions must do better to address societal needs, and those opportunities begin with more holistic training of providers.

Medical mistrust is well-documented across numerous marginalized communities, and this mistrust limits access to and effectiveness of health care (Armstrong, et al., 2007; Benkert et al., 2019). Additionally, women, people with disabilities, and indigenous populations face pervasive bias within the traditional biomedical model (Crear-Perry et al., 2021; Nicholls, et al., 2016). The lack of diversity within the health-care workforce directly and negatively impacts health outcomes for underserved and underrepresented communities (Jackson & Garcia, 2014; Smedley, et al. 2004). Crear-Perry et al. (2021) advocated for a care delivery model in which respect is conferred to those seeking care. They described an “approach to patient-centered care that requires providers to engage with the experience of disenfranchised groups and to acknowledge the role of society and history in influencing both their own understanding of their patient and their patient’s understanding of them” (Crear-Perry et al., 2021, p. 233).

This connection with patients and their unique experiences demands clinicians’ ability to reflect on their own position, experiences, and biases. This reflection corresponds with Tervalon and Murray-Garcia’s (1998) concept of cultural humility. The holistic and culturally humble health professional demonstrates empathy and looks upstream to manage health and wellness to “improve the human experience” (APTA, n.d., vision statement). It is up to health professions training programs to enact this vision.

## Summary

Societal needs are complex and the demands on the healthcare workforce are high. Aspiring clinicians must fulfill roles as both a skilled clinician and an empathetic and culturally humble health care practitioner. Health professions curricula face the challenge of training clinicians to meet these expectations. A holistic approach is needed to expand active learning strategies that foster clinical reasoning and clinical decision-making skills that can be transferred across diverse healthcare settings. Students must also build a practice of thoughtful and honest reflection to understand their relationship with the communities they serve. As the medical profession contends with rising acuity and complexity of health conditions, allied health professions, such as physical therapy, have an opportunity to leverage their skills, time with clients, and knowledge to address holistic health and wellness of communities and populations.

A population health framework enables consideration of social, environmental, cultural, and structural elements that contribute to an individual's or community's circumstances. This process shifts the care model away from individual disease or pathology management and looks to multifactorial contributions to the human condition, thus enabling more comprehensive solutions and prevention strategies. Without training and practice in cultural humility, aspiring clinicians may not gain the full benefit of the population health framework to address community health concerns. The current study looked to a doctor of physical therapy (DPT) program within an urban college of public health, which aims to train culturally humble clinicians, to identify educational practices that may foster or hinder awareness of and competence in social and structural drivers of health.

The extensive literature on training and assessment practices supports the use of competency-based approaches, but a wide variety of implementation complicates objective evaluation of student competence. A solitary educational strategy is unlikely to fulfill the needs of the varied health professions and a diverse society. Geographic and community differences underscore the need for educational programs to tailor their training strategies to the needs of their surrounding communities.

This literature review summarizes the value and limitations of current competency-based education frameworks, the need to focus educational efforts on social determinants of health and holistic training strategies, and the importance of drawing connections between educational practices and patient and community outcomes. Based on this literature, this study explored potential connections between student characteristics and curricular characteristics at one urban college of public health and DPT students' perceived knowledge and competence in addressing SDOH. Capturing students' perceptions offered additional insight into where current educational practices are succeeding in fostering student competence specific to SDOH and where future educational efforts may be redirected. This study adds to the literature by documenting associations between student perceptions, student characteristics, and curricular characteristics using mixed methodology. This triangulation of data has not been overtly described in existing literature and informs direction for future research to identify curricular content and teaching strategies to optimally train future doctors of physical therapy to meet population health needs.

## **CHAPTER 3**

### **METHODS**

The primary purpose of this study was to explore doctor of physical therapy (DPT) students' self-evaluation and perceptions of competence specific to social and structural determinants of health (SDOH) in hopes of gaining insight into elements of their education that contributed to that preparation and/or what strategies and resources are needed to foster competence in this area. A secondary aim of this study was to explore how individual student factors and curricular factors impact students' awareness of and perceived competence in addressing social and structural determinants of health. This inquiry uses *awareness* as a term to capture students' recognition or knowledge of a construct (SDOH) and *perceived skills competence* as students' perceived preparedness to address or clinically manage SDOH.

#### **Research Questions**

1. How do current doctor of physical therapy students self-evaluate and perceive their preparedness to address social and structural determinants of health (SDOH)?
2. How do personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health?
  - a. Sub question: How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?
  - b. Sub question: In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?

A hypothesis driving this research was that learners may overestimate their knowledge of and competence in addressing SDOH upon entry into a DPT curriculum. This speculation was consistent with similar research regarding students' perceptions of their clinical skill set as they progress through a doctor of physical therapy curriculum (Alexander et al., 2016). As learners progressed through their first year of academic coursework and initial exposure to community-based learning experiences, they were expected to display a better understanding of how much they have yet to learn. Based on the work of Kruger and Dunning (1999), this realization of limited or narrow scope of knowledge among participants progressing through a health professions curriculum was expected to result in a decline in confidence to address SDOH as they moved through the early part of the curriculum. As learners gained increasing exposure through community practice opportunities and full-time clinical learning experiences, participants' perceived competence was expected to trend upward with respect to addressing SDOH.

A second hypothesis was that students from diverse demographic backgrounds and students with work and life experience beyond the continuous high school to college to graduate school trajectory may exhibit greater awareness of and competence in addressing SDOH. This anticipated observation was consistent with the work of Bernal and Froman (1987) who found that personal characteristics predicted cultural self-efficacy in community nurses; specifically, participants with multilingual skills and who identified as part of a minoritized or marginalized racial or ethnic group demonstrated greater cultural self-efficacy within their practice settings.

## Study Design

This study employed mixed methodology involving a quantitative survey and in-depth, semi-structured interviews to explore current DPT students’ perceptions of their knowledge and competence to address social and structural determinants of health and to identify the personal and curricular factors that influenced those perceptions. Students in the program in this study followed a lockstep curriculum, meaning they all took the same sequence of course work across a three-year curriculum. While academic coursework was delivered by consistent faculty, clinical experiential opportunities and clinical faculty varied pending students’ learning interests and needs. DPT student participants were recruited via email listservs for each student cohort representing three time points in the curriculum (first-year, second-year, and third-year students). This email invitation was distributed by the program director of the DPT program, which is a standard means of communication within this program. Table 3.1 depicts participants by cohort and respective timepoint in the curriculum in which study participation occurred.

| <b>Table 3.1</b>  |  |                                    |
|---|--|------------------------------------|
| <i>Participant admission year, year in program, and curricular timepoint of study participation</i> |  |                                    |
| Year/semester of matriculation into DPT program   | Year in DPT program at time of study participation | Semester of participation          |
| Summer 1 2021   | 3 <sup>rd</sup> Year (DPT 3 Cohort 2024)           | Summer 3 2023 (program semester 7) |
| Summer 1 2022   | 2 <sup>nd</sup> Year (DPT 2 Cohort 2025)           | Summer 2 2023 (program semester 4) |
| Summer 1 2023   | 1 <sup>st</sup> Year (DPT 1 Cohort 2026)           | Summer 1 2023 (program semester 1) |

Research question one (How do current doctor of physical therapy students self-evaluate and perceive their preparedness to address social and structural determinants of health [SDOH]?) was investigated using mixed methods via a survey that I built from existing literature (Crandall et al., 1993; Magnusson et al., 2020) to capture participants' attitudes toward SDOH and perceptions of knowledge and competence in addressing SDOH (see Appendix A for the complete survey) and semi-structured interviews to provide clarification and elaboration of participants' perspectives (see Appendix B for the interview protocol). Survey and interview questions were informed by the population health, prevention, health promotion, and wellness (PHPW) competencies articulated by Magnusson et al. (2020) as well as the Medical Student Attitudes Toward Serving the Underserved, or the MSATU self-report survey (Crandall et al., 1993).

Research question two (How do personal and/or educational/curricular factors impact awareness of and competence in addressing social and structural determinants of health?) also used mixed methodology. For the quantitative arm, participants' self-identified demographics, such as age, year in program, gender identity, racial identity, and first-generation college student status, were compared with survey results for self-assessed attitudes and perceived knowledge and skills competence in addressing SDOH. For the qualitative arm, semi-structured interview questions prompted participants to reflect on the educational and personal experiences that shaped their awareness of and competence in addressing SDOH. Interview questions also explored activities or experiences that prompted participants' reflection on professional growth and potential sources of bias and addressed a sub question to research question two (In what ways do

demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?).

Comparison of perceived competence based on cohort/year in the DPT program provided insight into impact of curriculum on participants' responses. This comparison addressed the other sub question to research question two (How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?). This triangulation of student perceptions, student characteristics, and curricular timepoint evaluated by survey and interview methodology provided validation of findings regarding SDOH content and students' perceptions of that content within one doctor of physical therapy program. This study also illuminated factors that warrant further attention and effort with respect to curricular development and teaching strategies.

### **Rationale for Study Design**

Based on the research purpose and questions, mixed methodology was optimal for quantifying students' attitudes toward SDOH and perceptions of knowledge and competence in addressing SDOH while also providing descriptive insight from the perspective of current students. A survey allows for collection of a breadth of demographic information and offers participants an opportunity to consider sample beliefs and behaviors related to SDOH. The survey also captured student perceptions at various time points in the curriculum – a research tactic that served as a proxy for curricular impact in the absence of a longitudinal study design. As noted in the literature review, Crandall et al. (1993) found a change in student perceptions over time in a medical curriculum, but the authors did not have the qualitative data to explain the possible varied mechanisms for their findings.

For the current study, qualitative methodology drew upon phenomenological principles and employed qualitative description to explore student experiences with the complexities of SDOH as they navigated a doctoral level curriculum. This approach afforded rich, descriptive data to better understand how students experience competence, or a lack of competence, regarding SDOH and offered insight into what shaped those experiences and how and why students' perceptions change across the curriculum.

### **Study Site and Context**

This study explored the perspectives of students within a doctor of physical therapy (DPT) program housed within a college of public health in an urban research university. The college of public health is home to several public health and rehabilitation programs, including speech and language pathology, occupational therapy, recreational therapy, nursing, public health, and social work, among others. The public health model provides learners a broad understanding of health and allows for multiple health professions "to learn about, from, and with each other" (World Health Organization [WHO], 2010, p. 13) in an inter-professional environment. Each of the programs' mission statements includes a focus on the health of society through profession-specific means, and these individual program missions complement the overarching college commitment to the health of people and populations via community-centeredness and cultural humility. This holistic approach to public health aims to foster learners' comprehensive understanding of the multiple factors that contribute to health and wellness of populations and individuals. Students' perceptions within this model have not been explicitly explored, and this project is one of the first studies (to the author's knowledge) to investigate student and curricular characteristics that shape students' perspectives.

## **Participants and Curriculum**

Participants for this study included first-, second-, and third-year graduate learners within the DPT program. The program is a three-year post-baccalaureate, clinical doctoral degree, which is the standard entry degree for the profession. Students matriculate or enroll in the curriculum as a cohort of peers at the start of the summer semester each year, progress through three years of year-round academic and clinical coursework (three semesters per year: fall, spring, and summer), and graduate at the end of their third spring semester. Graduates must then take the National Physical Therapy Examination (NPTE) to earn professional licensure in the state of their choice.

The curriculum begins with foundational science coursework, including gross human anatomy, pathophysiology, and biomechanics. This coursework is aligned with clinical examination and interventions coursework, and students apply that content in a community clinical practice setting beginning in their second semester (fall semester of year one). Integrated clinical courses interweave classroom discussion and reflection and part-time clinical practice in one of three clinical sites: 1) an urban, level one, trauma center/teaching hospital; 2) a pro bono physical therapy clinic; 3) an interprofessional community clinic. Integrated clinical courses occur during semesters two through six of this nine semester curriculum, and course expectations are graduated as learners progress each semester. Following completion of the sixth semester of academic and clinical course work, learners then progress to full-time clinical training for three additional semesters. Appendix C provides an overview of the curricular model.

While academic coursework is consistent in structure and delivered by consistent core and adjunct faculty, full-time clinical training sites vary by students' interest and

learning requirements. Performance during clinical experiences is evaluated by the clinical instructor affiliated with each site. Approximately 55 students matriculate in each annual cohort of learners, resulting in a total of approximately 165 students enrolled in any academic year across the three-year program. These students provided the population from which study participants were drawn.

## **Data Collection**

### **Survey Description, Development, and Distribution**

This study was reviewed by the institutional review board of my educational institution (which was also the study site) and was deemed to be “not human subjects research” based on the criteria for program assessment. Although “not human subjects research,” I followed ethical guidelines proposed by the institutional review board to develop an anonymous survey to gather demographic information (e.g., age, year in program, first generation status, gender identity, race, language proficiencies, etc.). The survey also inquired about work experience and personal experiences with health care practitioners in the allied health and medical professions. Additionally, the participant survey drew upon established guidelines and educational expectations pertaining to population health and SDOH as well as the limited existing measures that attempt to capture student perceptions of SDOH and serving underserved communities (APTA, 2021; Crandall et al., 1993; Magnusson et al., 2020; Molitor et al., 2021). The survey was organized into six sections to capture 1) demographics, 2) work experience, 3) personal experience with various health professionals, 4) attitudes, 5) perceived knowledge and 6) perceived skills specific to SDOH. Table 3.2 displays demographic information included in the survey.

| <b>Table 3.2</b>   |  |
|--|--|
| <i>Demographic information collected from participants</i> |  |
| Year in DPT program  | 1  |
|  | 2  |
|  | 3  |
| Gender identity  | Woman  |
|  | Man  |
|  | Agender  |
|  | Non-binary   |
|  | Transgender  |
|  | Prefer not to answer   |
|  | Other  |
| Age  | Years  |
| Traditional or Non-traditional student                     | A traditional student is a student who has pursued undergraduate directly upon high school completion and then subsequent graduate studies. A “Non-traditional” student is defined as a student who has taken at least one year of time between high school and undergraduate or between undergraduate and graduate studies for work, travel, family obligations, etc. Individuals pursuing a career change/second career are also categorized as nontraditional students. |
| First generation college graduate                          | Yes  |
|  | No   |
| Prior or current clinical work experience                  | Describe   |
| Prior or current service/volunteer experience              | Describe   |
| FAFSA filed as a graduate student                          | Yes  |
|  | No   |
| Race/ethnicity (select all that apply)                     | Black or African American  |
|  | Asian or Asian American  |
|  | Native American or Alaskan Native  |
|  | Hispanic, Latino, or Lantinx   |
|  | Middle Eastern or Arab   |
|  | Pacific Islander or Native Hawaiian  |
|  | White or Caucasian or European   |
|  | Prefer not to answer   |

Table 3.3 includes sample behaviors from the survey to gauge students' attitudes toward, perceived knowledge of, and perceived competence in SDOH. The complete survey is found in Appendix A and was built in Qualtrics® for email distribution.

| <b>Table 3.3</b>                            |  |
|---|--|
| <i>Survey sample beliefs and behaviors</i>  |  |
| <i>Survey categories</i>                    | <i>Sample behaviors</i>  |
| Survey question 17:<br>Attitudes            | Physical therapy services should be available to all members of the community, regardless of an individual's financial resources or insurance status.                                |
|   | Physical therapists have a professional responsibility to provide pro bono services to individuals and communities that are underserved by the health care system.                   |
|   | Mutual trust between a physical therapist and the individual or community receiving services is essential for societal health and wellness.  |
| Survey question 18:<br>Perceived Knowledge  | I recognize potential barriers to an individual's health, including but not limited to, societal, structural, community, and individual barriers.                                    |
|   | I understand the concept of population health and my role (as a physical therapy student) in addressing health and wellness, disease prevention, and health promotion.               |
|   | I recognize clients' potential need for services outside of my own scope of practice, specifically mental health services and social services.                                       |
| Survey question 19:<br>Skill Implementation | I provide screening in community or clinical settings using evidence-based health promotion and prevention resources.  |
|   | I educate individuals and communities about the value of movement and exercise to improve health and reduce disease risk.  |
|   | I utilize community resources to promote healthy behaviors (e.g., physical activity, stress reduction/management, sleep hygiene, smoking cessation) for individuals and communities. |

Based on existing literature (Crandall et al., 1993, 2007; Molitor et al., 2021), a Likert scale format was used to capture attitudes, perceived knowledge, and perceived skills competence specific to SDOH. The compiled survey draft was shared with six

academic researchers identified for their teaching and research expertise related to SDOH. Necessary modifications were made following feedback from the expert panel – specifically, clarification of language for some survey items and removal of a “neutral” category within the Likert scale. The final survey was piloted among four non-health care working adults and two health professionals for content clarity and length prior to distribution for this study. The end of the survey provided an option for the participants to share their email (de-coupled from their survey responses to maintain survey anonymity) to be contacted for a voluntary interview.

### **Survey Participants**

A total of 94 participants (out of a pool of 165 DPT students) opened the survey link, yielding a 57% response rate. Eight entries were removed because no data was entered for those participants. Blank survey attempts were reviewed for timing of attempt, and no pattern was detected based on date of attempt. After removing blank survey data, 86 participants’ data were analyzed. The entire survey was completed by 72 participants. Of the 14 participants who did not complete the survey, most participants stopped after demographic and background questions. The questions left blank pertained to attitudes about social and structural determinants of health (SDOH), perceived knowledge about SDOH, and perceived skills competence with SDOH.

Most participants who stopped the survey were late respondents and opened the survey near the closing of the response window. Incomplete responders included two third-year students, five second-year students, and seven first-year students. First-year students may not have felt equipped to answer some of the questions due to their limited clinical exposure. Among the non-complete respondents, one participant finished all but a

portion of the question group related to perceived skills competence with SDOH. Nine of the 14 incomplete responders identified as white. The mode was imputed for all 14 participants for any missing responses to the sample behavior questions for attitudes, perceived knowledge, and perceived skills competence.

Table 3.4 shows survey participants' demographics, and Table 3.5 details characteristics of incomplete responders. Participants are numbered according to the order in which they completed the survey. The race categories for Asian and Middle Eastern were combined to preserve anonymity of survey participants due to low numbers of participants who identified as either Asian or Middle Eastern in each cohort.

**Table 3.4***Characteristics of survey participants*

| Characteristic          | N  | %    |
|-------------------------|----|------|
| Year in program         |    |      |
| Year 1                  | 43 | 50   |
| Year 2                  | 23 | 26.7 |
| Year 3                  | 20 | 23.3 |
| Gender identity         |    |      |
| Cisgender female        | 62 | 72.1 |
| Cisgender male          | 22 | 25.6 |
| Gender fluid            | 1  | 1.2  |
| Other                   | 1  | 1.2  |
| Race                    |    |      |
| Black                   | 10 | 11.6 |
| Asian or Middle Eastern | 13 | 15.1 |
| Hispanic                | 1  | 1.2  |
| White                   | 62 | 72.1 |
| First Generation        |    |      |
| Yes                     | 24 | 27.9 |
| No                      | 62 | 72.1 |

---

Note. N = 86

**Table 3.5***Characteristics of incomplete survey responders*

| Participant Number                                      | Year in Program | Gender Identity | Race                    |
|---|-----------------|-----------------|-------------------------|
| 14  | 1               | male            | Black                   |
| 17  | 3               | female          | Black                   |
| 44  | 2               | female          | White                   |
| 65  | 1               | female          | White                   |
| 68  | 1               | male            | White                   |
| 78  | 2               | female          | White                   |
| 79  | 2               | female          | White                   |
| 80  | 2               | female          | White                   |
| 81  | 1               | female          | Asian or Middle Eastern |
| 82  | 3               | female          | White                   |
| 83  | 1               | male            | Asian or Middle Eastern |
| 84  | 1               | female          | White                   |
| 85  | 1               | female          | Asian or Middle Eastern |
| 86 (stopped part way through perceived skills question) | 2               | female          | White                   |

## **Interview Description and Development**

Interview questions were based upon the public health and wellness competencies articulated by Magnusson et al. (2020), by the Commission on Accreditation in Physical Therapy Education standards (CAPTE, 2020), and by the self-report survey, Medical Student Attitudes Toward the Underserved, or MSATU (Crandall et al., 1993, 2007). The primary aims of these interviews were to capture student perceptions of their awareness and competence to address SDOH (research question one) and to identify personal and curricular characteristics that contributed to those perceptions (research question two). Example interview questions included: “What specific learning activities in the program alerted you to the concept of SDOH?” and “Which personal factors (e.g., aspects of your personal experiences or identity) have influenced your awareness of or competence in addressing SDOH?” The complete interview template is found in Appendix B.

## **Interview Participants**

Interview participants were identified via a decoupled survey question, which allowed participants to submit contact information without compromising the anonymity of their survey responses. Fifteen participants volunteered their contact information for participation in the interview process. One participant, a first-year student, failed to respond to follow up for scheduling the interview, leaving 14 participants who completed the interview protocol. Table 3.6 summarizes interview participants’ demographics. There is no connection between survey participant numbers and interview participant numbers. Within the context of the interviews, seven participants identified a marginalized aspect of their identity, such as identifying as a racial minority or coming

from a low socioeconomic background. Details regarding participants' self-identified marginalized identity are not included to preserve participants' anonymity.

**Table 3.6**

*Interview participants' demographics*

| Interview Participant          | Year in Program | Gender | Self-identified Marginalized identity (Yes/No) |
|--------------------------------|-----------------|--------|--|
| Participant 1                  | 3               | Female | Yes  |
| Participant 2                  | 2               | Female | Yes  |
| Participant 3                  | 2               | Female | No   |
| Participant 4                  | 1               | Female | No   |
| Participant 5                  | 3               | Male   | Yes  |
| Participant 6                  | 3               | Female | Yes  |
| Participant 7                  | 2               | Female | Yes  |
| Participant 8                  | 2               | Female | No   |
| Participant 9                  | 1               | Male   | No   |
| Participant 10                 | 2               | Female | No   |
| Participant 11                 | 2               | Female | Yes  |
| Participant 12                 | 1               | Female | No   |
| Participant 13                 | 3               | Female | No   |
| Participant 14                 | 3               | Female | Yes  |
| Participant 15 (non-responder) | 1               | Male   | Unknown  |

**Data Analysis**

Quantitative analysis used bivariate and multivariate methods to address the research questions. Multiple regression was used to determine the magnitude of the association between the explanatory or predictor variables (e.g., participant demographics, curricular characteristics, perceived knowledge) and the dependent variable (perceived skills competence). I investigated possible correlations among explanatory variables to examine potential collinearity. ANOVAs were conducted to identify potential impact of individual characteristics on self-reported attitudes, perceived

knowledge, and perceived skills competence specific to social and structural determinants of health. Crosstabulations further explored the relationship between work experience and volunteer experience. These findings, described in detail in Chapter Four, offer insight into the possible associations between student demographics, individual experiences, and curricular progression and students' perceived competence in addressing social and structural determinants of health. All analyses were completed with IBM SPSS Statistics for Windows, Version 29.0.

The qualitative arm of this study used qualitative description and phenomenology to understand 1) how students experience and perceive their preparedness to address SDOH; and 2) their perceptions of how personal and curricular characteristics impact that preparedness. This process followed the guidance of Creswell and Poth (2018) to seek a rich description of participants' experiences and how they experience it. Interviews were in-depth, semi-structured, recorded, and transcribed using Microsoft Word's<sup>®</sup> transcription feature. Interview audio recordings were reviewed and compared with transcriptions for accuracy. Written memos reflected initial reactions to participants' statements. Audio recordings were reviewed again during close reading of the transcripts to ensure accurate interpretation of participants' statements, which were coded and analyzed. Repeated and continuous transcription review allowed for an iterative coding process, categorization, and thematic analysis. Interviews proceeded with at least three participants for each cohort for a total of fourteen participants. Iterative coding throughout data collection allowed for determination of data saturation with fourteen interview participants.

Mays and Brevetti (2020) articulated a “rigorous act of coding, imagination and logic to aggregate findings” (p. 63). Following this model, the rich descriptions of what students experience as they progress through their academic and clinical training offered a vivid picture of the students’ perceptions of preparedness or competence regarding SDOH. The resulting themes provide insightful responses to the research questions. These themes, detailed in Chapter Four, add to the larger body of literature on training in SDOH by articulating students’ perceptions of competence. Table 3.7 provides a summary of research methodology.

| <b>Table 3.7</b>   |  |                 |   |
|--|--|-----------------|---|
| <i>Summary of research methodology</i>   |  |                 |   |
| Research Question  | Data Source  | Research Method | Analysis  |
| How do current doctor of physical therapy students self-evaluate and perceive their preparedness to address social and structural determinants of health (SDOH)? | Survey responses to questions on attitudes, perceived knowledge, and perceived skills competence | Quantitative    | Bivariate statistics (ANOVA)<br>Depth and breadth scales of survey questions on attitudes, perceived knowledge, and perceived skills competence |
|  | Interviews   | Qualitative     | In-depth analysis using phenomenological principles of iterative coding of participants words and clustering of meaning to identify themes      |
| <i>Continued</i>   |  |                 |   |

**Table 3.7***Continued*

|  |   |              |  |
|--|---|--------------|--|
| <p>How do personal and/or educational/curricular factors impact awareness of and competence in addressing social and structural determinants of health?</p> <ul style="list-style-type: none"> <li>• How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?</li> </ul> | Survey responses  | Quantitative | <p>Multivariate statistics (Regression) to capture the effects of independent variables (e.g., demographics) on survey responses for perceived skills (competence) related to SDOH</p> <p>Bivariate statistics (Crosstabs, correlation, and ANOVA) to compare survey responses across participant groups</p> |
| <ul style="list-style-type: none"> <li>• In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?</li> </ul>  | Interviews  | Qualitative  | In-depth analysis using qualitative description and phenomenological principles of iterative coding of participants words and clustering of meaning to identify themes   |
|  | Open-ended survey responses related to experiences with health care providers | Qualitative  | In-depth analysis of open-ended survey responses   |

## **Validity/Reliability and Trustworthiness**

As I was intimately involved in curricular design and classroom and clinical training within the DPT program serving as the site for this study, bracketing of my own assumptions was essential for objective analysis. I engaged in continuous reflexivity to monitor my potential biases throughout data collection and data analysis. I kept memos and notes throughout qualitative analysis and debriefed with two colleagues with qualitative research experience to optimize objectivity of my interpretations of participants' interview responses. A sample of six interviews was shared with these same two colleagues (three interviews each), who are academicians/clinicians with clinical expertise in the local community. They independently coded the interview samples and provided written feedback. Peer debriefing offered further validation for the final themes for the qualitative arm of this study. Additionally, member checking of final interpretations of qualitative data assisted with accurate representation of the data. Three interview participants representing each of the three cohorts provided written feedback on the final codebook. These participants confirmed agreement with the thematic analysis and provided additional insights, which were woven into the final codebook in Appendix D. With respect to data sources and collection, use of pilot testing for both the survey and interview template facilitated validity for those sources of data. Triangulation of data across survey results and interviews also bolstered validity of findings.

## **Summary**

As the intended goal of health professions training is to produce competent clinicians capable of addressing and meeting societal needs, this study offers insight into the impact and value of current educational practices at one DPT program housed within

an urban college of public health. The findings, discussed in Chapter Four, address the research questions regarding how individual and curricular characteristics impact students' perceptions of preparedness to address SDOH and may help to inform future inquiries regarding educational methodology and clinical training practices.

## **CHAPTER 4**

### **DATA ANALYSIS AND RESULTS**

This study explored current doctor of physical therapy students' attitudes, perceived knowledge, and perceived skills competence pertaining to social and structural determinants of health. A survey that I developed from existing literature (see Appendix A) and semi-structured interviews (see Appendix B) were used to collect data to answer the specific research questions:

1. How do current doctor of physical therapy students self-evaluate and perceive their preparedness to address social and structural determinants of health (SDOH)?
2. How do personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health?
  - a. Sub question: How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?
  - b. Sub question: In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?

The survey included demographic and background questions, such as work experience and exposure to various health professions. This information was compared to responses to sample beliefs and behaviors, which were drawn from the literature (Crandall et al., 1993; Magnusson et al., 2020) and grouped to capture participants' attitudes, perceived knowledge, and perceived skills competence, with respect to social and structural determinants of health.

## **Research Question One**

The first research question explored how current doctor of physical therapy students self-evaluate and perceive their preparedness to address social and structural determinants of health (SDOH). This inquiry was important for understanding students' attitudes toward this topic and their comprehension of the impact of SDOH for their current learning and future clinical practice. As noted in extant literature, upstream social and structural factors account for client outcomes more than specific downstream medical interventions (Holt-Lunstad et al., 2010; Krause, Schaefer, & Highfield, 2021). The ultimate aim of health care is to positively impact clients and communities; therefore, understanding current students' attitudes, perceived knowledge, and perceived skills competence with upstream health factors is essential for determining what elements of the curriculum are working and what needs refined to best equip the future workforce to meet societal needs.

### **Survey Results**

The descriptive statistics for survey results for questions pertaining to attitudes, perceived knowledge, and perceived skills competence are presented in Tables 4.1, 4.2, and 4.3, respectively. These questions involved sample beliefs and behaviors in which participants rated their level of agreement (questions pertaining to attitudes) or their perceived level of competence (questions pertaining to knowledge and skills) with each item. Participants showed high levels of agreement with sample beliefs regarding attitudes toward SDOH and greater variability with ratings of competence with respect to knowledge and skills.

| <b>Table 4.1</b>   |   |
|--|---|
| <i>Survey responses to sample beliefs pertaining to attitudes toward SDOH</i>  |   |
| Sample beliefs   | N (%)   |
| Physical therapy services should be available to all members of the community, regardless of an individual's financial resources or insurance status.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>              | <p>0 (0.0)</p> <p>1 (1.2)</p> <p>12 (14.0)</p> <p>73 (84.9)</p> |
| Physical therapy services should be available to all members of the community, regardless of an individual's citizenship or immigration status.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>                    | <p>0 (0.0)</p> <p>1 (1.2)</p> <p>12 (14.0)</p> <p>73 (84.9)</p> |
| Access to resources to maintain health and wellness should be a priority for federal funding programs.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>   | <p>0 (0.0)</p> <p>0 (0.0)</p> <p>14 (16.3)</p> <p>72 (83.7)</p> |
| Physical therapists have a professional responsibility to provide pro bono services to individuals and communities that are underserved by the health care system.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul> | <p>0 (0.0)</p> <p>4 (4.7)</p> <p>34 (39.5)</p> <p>48 (55.8)</p> |
| Physical therapists have a responsibility to engage in community health efforts.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>   | <p>0 (0.0)</p> <p>1 (1.2)</p> <p>32 (37.2)</p> <p>53 (61.6)</p> |
| Physical therapists should engage in community-based education about healthy behaviors.<br><ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>  | <p>0 (0.0)</p> <p>0 (0.0)</p> <p>16 (18.6)</p> <p>70 (81.4)</p> |
| <i>Continued</i>   |   |

| <b>Table 4.1</b>  |  |
|---|--|
| <i>Continued</i>  |  |
| Sample beliefs  | N (%)  |
| During my DPT education, I have a personal responsibility to provide pro bono services to individuals and communities that are underserved by the health care system. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>              | 0 (0.0)<br>4 (4.7)<br>47 (54.7)<br>35 (40.7) |
| Within my DPT education, I am interested in volunteering in pro bono clinical and community programs that provide physical therapy services to underserved communities. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>            | 0 (0.0)<br>2 (2.3)<br>21 (24.4)<br>63 (73.3) |
| I am vested in the needs of others. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>  | 0 (0.0)<br>1 (1.2)<br>24 (27.9)<br>61 (70.9) |
| I respect the values of others, even if they are different from my own. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>  | 0 (0.0)<br>0 (0.0)<br>25 (29.1)<br>61 (70.9) |
| I acknowledge my own potential biases, including but not limited to biases about body size, ability levels, educational levels, gender identity, race and ethnicity, and religion. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul> | 0 (0.0)<br>0 (0.0)<br>30 (34.9)<br>56 (65.1) |
| Mutual trust between a physical therapist and the individual or community receiving services is essential for societal health and wellness. <ul style="list-style-type: none"> <li>- Strongly disagree</li> <li>- Disagree</li> <li>- Agree</li> <li>- Strongly agree</li> </ul>  | 0 (0.0)<br>0 (0.0)<br>13 (15.1)<br>73 (84.9) |

| <b>Table 4.2</b>  |  |
|---|--|
| <i>Survey responses to sample behaviors pertaining to perceived knowledge about SDOH</i>  |  |
| Sample behaviors  | N (%)  |
| I recognize potential barriers to an individual's health, including but not limited to, societal, structural, community, and individual barriers. <ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                      | 0 (0.0)<br>10 (11.6)<br>68 (79.1)<br>8 (9.3)   |
| I recognize risk factors for chronic disease and understand how these factors impact an individual's function, participation, and quality of life. <ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                     | 0 (0.0)<br>31 (36.0)<br>51 (59.3)<br>4 (4.7)   |
| I understand the constructs of behavior change theories and how these can be applied to evidence-based education and interventions for individuals and caregivers. <ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>     | 3 (3.5)<br>50 (58.1)<br>31 (36.0)<br>2 (2.3)   |
| I understand the concept of population health and my role (as a physical therapy student) in addressing health and wellness, disease prevention, and health promotion. <ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul> | 0 (0.0)<br>26 (30.2)<br>56 (65.1)<br>4 (4.7)   |
| I understand social and structural determinants of health and their impact on the health and wellness of individuals and communities. <ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                                  | 0 (0.0)<br>16 (18.6)<br>60 (69.8)<br>10 (11.6) |
| <i>Continued</i>  |  |

| <b>Table 4.2</b>  |  |
|---|--|
| <i>Continued</i>  |  |
| Sample behaviors  | N (%)  |
| I am able to identify health indicators (e.g., physical activity, educational level, socioeconomic status, and the built environment/neighborhood) and understand their role in monitoring population health.<br><ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul> | 1 (1.2)<br>24 (27.9)<br>56 (65.1)<br>5 (5.8)   |
| I know how to access population health data to inform plans for disease prevention and health promotion.<br><ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>  | 4 (4.7)<br>47 (54.7)<br>30 (34.9)<br>5 (5.8)   |
| I recognize clients' potential need for services outside of my own scope of practice, specifically mental health services and social services.<br><ul style="list-style-type: none"> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>  | 0 (0.0)<br>29 (33.7)<br>47 (54.7)<br>10 (11.6) |

| <b>Table 4.3</b>   |   |
|--|---|
| <i>Survey responses to sample behaviors pertaining to perceived skills specific to SDOH</i>  |   |
| Sample behaviors   | N (%)   |
| I consistently implement evidence-based health promotion with all clients and communities.<br><ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul> | 14 (16.3)<br>1 (1.2)<br>56 (65.1)<br>15 (17.4)<br>0 (0.0) |
| <i>Continued</i>   |   |

| <b>Table 4.3</b>  |   |
|---|---|
| <i>Continued</i>  |   |
| Sample behaviors  | N (%)   |
| I consistently provide screening in community or clinical settings using evidence-based health promotion and prevention resources. <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                             | 18 (20.9)<br>6 (7.0)<br>52 (60.5)<br>10 (11.6)<br>0 (0.0) |
| I am an informed member of the interprofessional health care team that effectively addresses and reduces disease risk factors for individuals and communities. <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul> | 16 (18.6)<br>5 (5.8)<br>47 (54.7)<br>18 (20.9)<br>0 (0.0) |
| I consistently educate individuals and communities about evidence-based nutritional recommendations to promote healthy eating. <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                                 | 18 (20.9)<br>8 (9.3)<br>45 (52.3)<br>15 (17.4)<br>0 (0.0) |
| I consistently educate individuals and communities about the value of movement and exercise to improve health and reduce disease risk. <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                         | 10 (11.6)<br>3 (3.5)<br>23 (26.7)<br>45 (52.3)<br>5 (5.8) |
| I consistently utilize community resources to promote healthy behaviors for individuals and communities. <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>   | 16 (18.6)<br>4 (4.7)<br>43 (50.0)<br>20 (23.3)<br>3 (3.5) |
| <i>Continued</i>  |   |

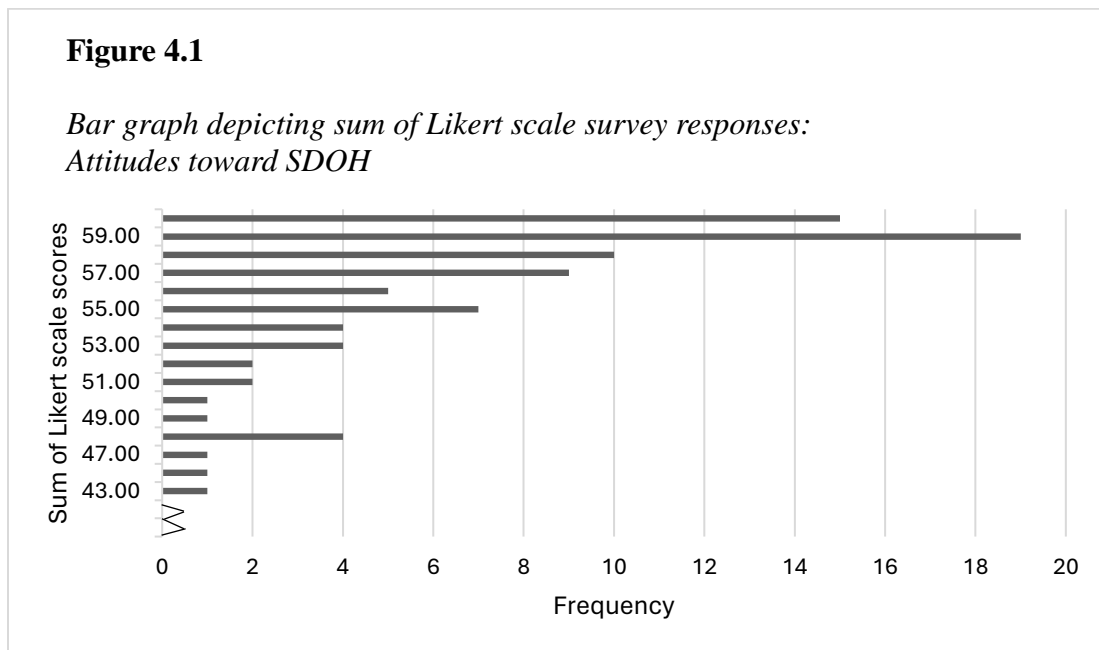
| <b>Table 4.3</b>   |  |
|--|--|
| <i>Continued</i>   |  |
| Sample behaviors   | N (%)  |
| <p>I consistently provide information regarding health promotion, wellness, and healthy behaviors while respecting an individual's needs.</p> <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>   | <p>12 (14.0)</p> <p>4 (4.7)</p> <p>48 (55.8)</p> <p>19 (22.1)</p> <p>3 (3.5)</p> |
| <p>I consistently assess individuals' and communities' health assets, risks, and goals, including assessment of environmental factors on health and wellness.</p> <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                             | <p>18 (20.9)</p> <p>3 (3.5)</p> <p>46 (53.5)</p> <p>18 (20.9)</p> <p>1 (1.2)</p> |
| <p>I consistently adapt evidence-based interventions based on individual assets, risks, and goals to optimally meet individual and community needs.</p> <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                                       | <p>20 (23.3)</p> <p>5 (5.8)</p> <p>46 (53.5)</p> <p>15 (17.4)</p> <p>0 (0.0)</p> |
| <p>When developing and implementing health promotion interventions, I consistently acknowledge and respond to health disparities experienced by marginalized and underserved communities.</p> <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul> | <p>19 (22.1)</p> <p>4 (4.7)</p> <p>49 (57.0)</p> <p>14 (16.3)</p> <p>0 (0.0)</p> |
| <p>I consistently incorporate knowledge of social and structural determinants of health into interventions to address disease prevention and health promotion.</p> <ul style="list-style-type: none"> <li>- No opportunity</li> <li>- Not at all competent</li> <li>- Developing competence</li> <li>- Competent (entry level)</li> <li>- Extremely competent (expert)</li> </ul>                            | <p>18 (20.9)</p> <p>4 (4.7)</p> <p>47 (54.7)</p> <p>16 (18.6)</p> <p>1 (1.2)</p> |
| <i>Continued</i>   |  |

| <b>Table 4.3</b>  |           |
|---|-----------|
| <i>Continued</i>  |           |
| I consistently incorporate stress-management strategies as a component of health promotion for individuals and communities. |           |
| - No opportunity  | 19 (22.1) |
| - Not at all competent  | 7 (8.1)   |
| - Developing competence   | 43 (50.0) |
| - Competent (entry level)   | 17 (19.8) |
| - Extremely competent (expert)  | 0 (0.0)   |
| I consistently refer clients to appropriate resources for mental health and social services, as needed.                     |           |
| - No opportunity  | 25 (29.1) |
| - Not at all competent  | 10 (11.6) |
| - Developing competence   | 41 (47.7) |
| - Competent (entry level)   | 10 (11.6) |
| - Extremely competent (expert)  | 0 (0.0)   |
| I consistently communicate and follow up with members of the interprofessional team to close the loop on clients' concerns. |           |
| - No opportunity  | 38 (44.2) |
| - Not at all competent  | 8 (9.3)   |
| - Developing competence   | 25 (29.1) |
| - Competent (entry level)   | 15 (17.4) |
| - Extremely competent (expert)  | 0 (0.0)   |

These Likert scale questions were summed to create depth and breadth scales for each cluster of items (attitudes, knowledge, and skills). Depth scales for each item captured intensity of participant responses to the specific sample beliefs or behaviors listed for each category. The depth scales presented in Figures 4.1 – 4.3 paint an important picture of participants' perceptions of the sample beliefs or behaviors for each category. Higher scale scores indicate more favorable attitudes toward SDOH or higher perceived competence with respect to knowledge and skills.

Figure 4.1 depicts the depth scale of participants' attitudes toward SDOH. Participants overwhelmingly provided positive responses to the 12 sample beliefs for this category. Responses to the items related to attitudes about SDOH demonstrated the least variability compared to survey questions related to knowledge and skills. Based on this

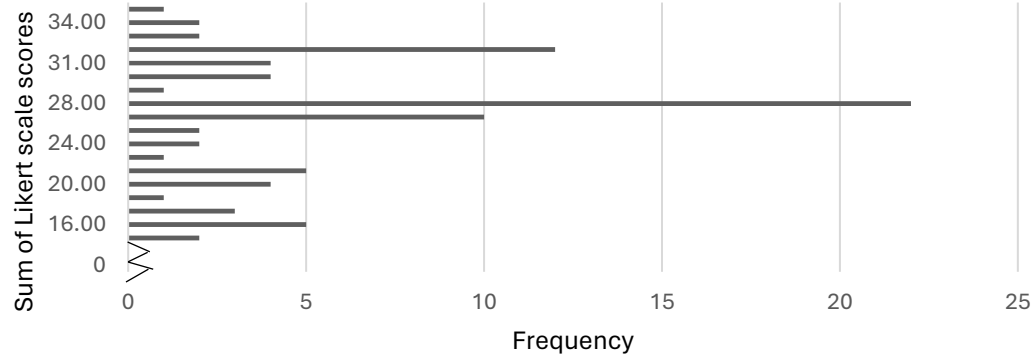
specific doctor of physical therapy program’s mission statement and the targeted curricular emphasis on service, a possible explanation of this finding is that the program recruits students who are vested in SDOH and service to others. Further exploration of the individual and curricular factors that may influence participants’ responses are discussed in detail in the section on research question two.



The survey questions pertaining to perceived knowledge about SDOH included eight behaviors. The depth scale results are presented in Figure 4.2. The depth scale for knowledge indicates that participants perceive that they are developing their competence in terms of knowledge about SDOH. This finding is an important contrast to survey questions about attitudes. While participants indicated primarily favorable attitudes toward SDOH, they recognized that their knowledge is growing in this content area. Research question two, discussed later in this chapter, further explored individual participant factors that may result in varying perceptions of knowledge.

**Figure 4.2**

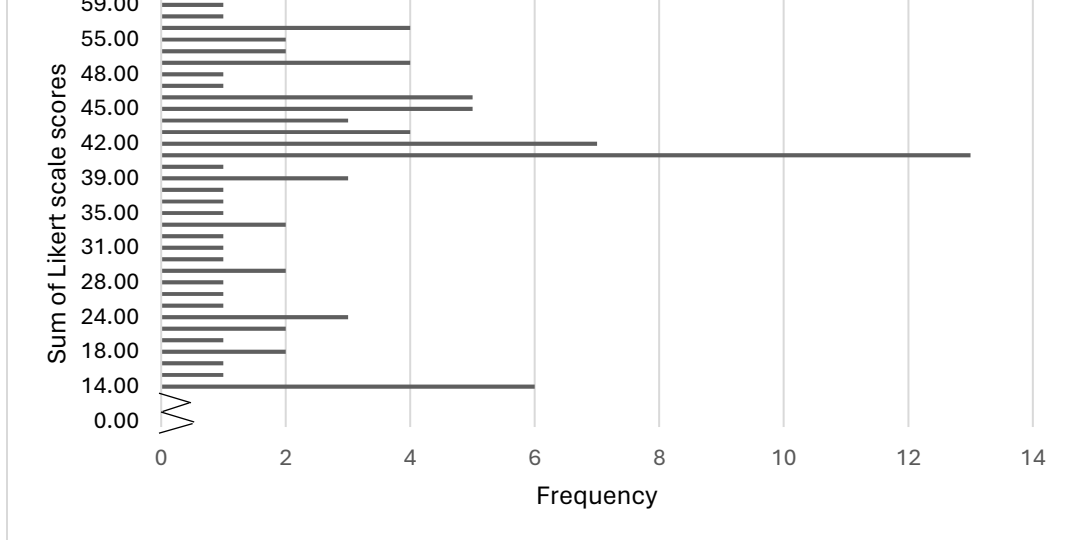
*Bar graph depicting sum of Likert scale survey responses:  
Perceived knowledge of SDOH*



The final section of survey questions explored 14 behaviors specific to skills competence in terms of addressing SDOH in the community and clinic settings. The responses varied, with the majority of participants indicating that they are developing competence with this skill set. The results for the depth scale for the sample behaviors in the perceived skills survey question are presented in Figure 4.3. Again, individual participant factors that may influence these results are discussed in the section on research question two.

**Figure 4.3**

*Bar graph depicting sum of Likert scale survey responses:  
Perceived skills competence specific to SDOH*



### **Qualitative Interview Results**

Fourteen participants completed a semi-structured, in-depth interview that explored their self-identified personal factors and curricular elements that influenced their attitudes and understanding of social and structural determinants of health. Following an iterative coding process described in detail in Chapter Three, the first resulting theme (Learners' perceived importance of social and structural determinants of health and factors that impact how to address them) provided insight to research question one and supported the quantitative findings from the survey. Participants articulated thoughts and perceptions that could be grouped into three categories under this theme: 1) professional responsibility and accountability; 2) recognition of bias and privilege; and 3) barriers and facilitators to addressing social and structural determinants of health. Table 4.4 depicts the primary theme related to research question one, the associated categories, and a

sample of corresponding initial codes. Representative sample quotes are also included.

The complete codebook is found in Appendix D.

| <b>Table 4.4</b>   |   |   |
|--|---|---|
| <i>Abbreviated code book for theme related to research question one</i>  |   |   |
| Theme 1: Learners' perceived importance of social and structural determinants of health and factors that impact how to address them                    |   |   |
| Example Open/<br>Initial Codes<br>(1 <sup>st</sup> cycle)  | Axial Codes/<br>Categories<br>(2 <sup>nd</sup> cycle) | Representative participant quotes   |
| Responsibility<br>Time with clients<br>Trust<br>Client autonomy<br>Practitioner as<br>advocate<br>Modeling behavior                                    | Professional<br>responsibility and<br>accountability  | “It’s our job. Like, you know, we came into this - hopefully, we all came to this position - to help people, like health practitioners in general. So we have to try and tailor our care to all of our patients and all our patients are not the same. So we need to make sure we know our full patient and all the things that make them them.”<br>(P2, second-year female student speaking of responsibility as a physical therapist) |
| Stigmatized<br>language<br>Privilege<br>Bias (cultural,<br>religious, racial,<br>personal)<br>Racial bias<br>Healthcare worker<br>bias/desensitization | Recognition of<br>bias and privilege                  | “I think a lot of [bias] comes from - as opposed to an awareness of how these cultures and details go - more of the over awareness. Like, [the clinicians] had been working with the community and this culture for so many years, it has created some of those assumptions.” (P5, third-year male student commenting on bias and desensitization observed within a government funded indigenous-serving health system)                 |
| <i>Continued</i>   |   |   |

| <b>Table 4.4</b>  |  |  |
|---|--|--|
| <i>Continued</i>  |  |  |
| Cognitive load<br>Agency as a student<br>Resources<br>Client trust<br>Client/therapist<br>cultural congruence | Barriers and<br>facilitators to<br>taking action | “There's a lot of information that you're learning about patients: family life, home life, their financial situation. So it's definitely hard to unpack that all in the situation.” (P8, second-year female student commenting on the complexity and challenge of addressing social factors in the clinic) |

### ***Professional Responsibility and Accountability***

Key takeaways from the interviews included participants’ sense of responsibility for providing holistic health care and the challenges of addressing bias and social determinants of health as a student clinician. Participant two, a second-year female student, emphasized holistic care when advocating for the importance of knowing “our full patient and all the things that make them them” (See Table 4.4). Connectivity with clients was mentioned by several participants, and interviewees consistently cited the advantage of a physical therapist’s time with clients to allow for rapport and client trust in a practitioner’s ability to address critical social needs. Participant eight, also a second-year student, articulated this concept well when comparing physical therapy to other professions:

Other healthcare providers might only have like 15 [minutes with a client], and they're just getting through what they need to. They don't have time to really sit down. So with our course of care, I feel like our profession is so special that our clients really, like, ease in and are comfortable with us to be able to bring up these topics.

This awareness of the benefit of connection corresponds with the work by Nicholls et al. (2016), who advocated for meaningful relationships with clients. A

collaborative model of care between the client and practitioner has the potential to mitigate “othering” (Nicholls et al., 2016). A collaborative model of care also minimizes the potential of hierarchy or power differential between a client and a practitioner. This concept intertwines with literature on the impact of trust, and mistrust, between clients and practitioners as a driver of health outcomes (Benkert et al., 2019) and underscores the need for accountability among practitioners.

### ***Recognition of Bias and Privilege***

Participant five, a third-year student, threaded the importance of accountability and recognition of bias when discussing care delivery within an indigenous community. This participant noted that prolonged exposure to a specific population without the practitioner’s ongoing reflection had the potential to perpetuate bias and stereotyping (see Table 4.4). Participant seven, a second-year student, also discussed the issue of desensitization among practitioners who work within a single community for a prolonged period of time. This participant described her experience in the acute hospital setting during an integrated clinical experience: “[The clinicians] kind of go in with a certain bias because they've worked at a place for long enough to know, probably, what type of situation they're walking into.” These observations highlighted the importance of empathy and reflexivity to overcome bias among practitioners and acknowledge the systemic and structural challenges faced by clients. They speak to the value of personal reflection to recognize one’s own position as a perceived outsider providing care within a community that is different from one’s own. In describing these situations, the participants underlined the importance and necessity of cultural humility as a part of impactful health care.

Other participants also noted the challenges of bias and privilege within the healthcare system. Specifically, biases among practitioners may perpetuate barriers for specific populations. Participant 14, a third-year student, identified a specific clinical example in which a clinician was dismissive of a client due to difficulty understanding the client's accent:

There were a couple of times when things were said about a person's accent, you know, because English wasn't their first language, or saying things like, "Oh well, you know, they're hard to understand anyways." How would I address it? I just said, "I don't mind having to ask a question twice if I need to or rephrase it."

Participant 14 demonstrated agency as a student clinician in this example. Diplomatically speaking up offered a means for remediating potential inequity in care delivery.

Participant six, another third-year student, described a similar situation in which she needed to redirect a patient interview because of perceived dismissiveness of the client's questions by the supervising clinician. Using empathetic inquiry to redirect the conversation and demonstrating interest in the client's situation, the student exercised her capacity to optimize the patient interview and build rapport.

### ***Barriers and Facilitators to Taking Action***

The examples of participants six and 14 described above linked the recognition of bias with strategies to combat those observed biases. They reiterated the importance of ongoing reflection as health care practitioners and demonstration of empathy as a source of agency. Clinicians' apparent frustration with perceived inability to intervene on social issues and a lack of adequate resources may have resulted in suboptimal care. Rather than succumbing to desensitization, these novice clinicians demonstrated agency and awareness of their responsibility to address holistic health needs by considering potential cultural or language barriers. The observed behaviors of some of these experienced

clinicians were in direct conflict with what the student participants perceived as empathetic and impactful care. The participants' ability to recognize and label this conflict demonstrated their awareness of the impact of social and cultural factors within the healthcare setting and their application of humility.

While the interviewees consistently noted the professional responsibility of physical therapists to address upstream drivers of health, healthcare access, and wellness, the ability to take action on these issues was a perceived limitation. Participants' comments indicated decreased confidence in addressing issues related to SDOH in real time in the clinic. As participant eight noted in the quote in Table 4.4, the complexity of information is "hard to unpack in a clinic situation." Other participants cited the challenge of cognitive load as a student who is trying to remember basic psychomotor skills and examination techniques amidst the stimulation of busy clinical settings. Participant eleven articulated the challenge of identifying resources for clients' social needs while still trying to recall basic knowledge:

When we go to [the] pro bono [clinic], the professor jumps in and provides the resources for the patient. We are not the first one who provides the resources, which I still appreciate that because, of course, sometimes I don't think about it because I'm more focused on, OK, I need to remember the skill from [a previous course]. So I need to do it properly. Of course, I am very involved and scared and, like, nervous about it.

This application of knowledge in a clinical context added a layer of difficulty for which student practitioners may not have felt confident. The students' awareness of potential social and structural barriers for clients was evident, but the ability to act on these issues remained uncertain. Participants felt hindered by their supervisors' perceived desensitization and occasional dismissiveness and their own limited knowledge of available resources within a specific clinic environment or community. Factors that

supported participants' sense of agency included awareness of local resources available for clients and communities and the ability to build relationships and trust with individual clients and populations.

### **Research Question One Summary**

Survey results for participants' attitudes and their perceived knowledge and skills competence specific to SDOH demonstrated that students perceive the importance and value of acknowledging and addressing these upstream factors that influence health. While participants' responses showed limited variability with largely positive attitudes about SDOH, knowledge and skills competence showed greater variability. On average, knowledge and skills were perceived as "developing competence" by the majority of participants.

In support of the survey findings, interview participants' comments reflected a foundational understanding of the importance of social and structural determinants of health. Participants recognized the need to address this component of health care despite feeling that they lacked the complete toolset for the job. While many participants noted barriers to addressing social and structural determinants of health in the clinic, awareness of local resources and client rapport were identified as facilitators for taking action and having a perceived positive impact on clients. Guidance and modeling by professors and clinic mentors had a positive influence on learners' perceptions of the importance of holistic health care, but participants also noted instances in which they felt the need to model positive behaviors for their clinical instructors. Categories that informed Theme One (Learners' perceived importance of social and structural determinants of health and factors that impact how to address them) included a sense of professional responsibility

and accountability, recognition of bias and privilege, and barriers and facilitators to taking action. While these findings shed light on students' current perceptions on the topic of social and structural determinants of health, research question two provided further insight into why and how these perceptions exist.

### **Research Question Two**

The second research question addressed how personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health. This question was approached via two sub questions that focused on: a) the potential change across the curriculum; and b) the impact of individual demographics and experiential characteristics. Relationships between individual characteristics and the curriculum and perceived skills competence were evaluated using regression analyses. This multivariate method allowed for identification of potential predictors for participants' perceived skill competence, and qualitative data provided context and additional insight regarding participants' perceptions.

The first sub question (How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?) was investigated using ANOVA to assess responses to survey questions regarding attitudes, perceived knowledge, and perceived skills based on year in the program. Without a longitudinal study design, this analysis by cohort or year in the program served as a proxy for the impact of the curriculum. The hypothesis was that participants acquire more knowledge and skills competence as they progress from year one, through year two, and through year three of this doctoral program. Qualitative data highlighted curricular

elements that participants believed had the greatest impact on their learning and skills competence specific to social and structural determinants of health.

The second sub question (In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?) was explored using ANOVA to assess responses to survey questions regarding attitudes, perceived knowledge, and perceived skills based on participant demographics. Cross tabulations also explored the impact of participants' work experiences, either clinical or nonclinical work, on service engagement. These results offered insight regarding experiences that may foster practitioners' investment in service and community engagement, which has been shown to bolster community health and wellness and empower communities (Dholakia & Hartman, 2023).

## **Impact of Demographics and Curriculum**

### ***Regression Analysis***

Research question two examined how personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health. Regression analysis identified predictors of participants' perceived skills competence. Since a desired outcome for a health professions training program is skill implementation, the skills competence breadth scale was used as the dependent variable. The knowledge breadth scale served as one of the predictor variables since foundational knowledge is a presumed necessity for skill implementation. The breadth scales for knowledge and skills were made by dichotomizing participants' responses into two categories: 1) Competent (either "competent" or "extremely

competent” on the Likert survey response) or 2) Developing competence (either “developing competence” or “not at all competent” or “no opportunity” on the Likert survey response) and summing all eight items for perceived knowledge and all 14 items for perceived skills competence. Predictor variables included in the model were: 1) Perceived knowledge (breadth scale); 2) Volunteer experience; 3) Male gender (yes or no); 4) Race (Person of Color or White); 5) First generation status (yes or no); 6) First year student (Cohort 2026, yes or no); and 7) Received PT Care: self or family (yes or no). Volunteer experience was a summation of yes or no responses to engagement in unpaid community or clinical service work prior to and during the DPT program and/or working as a caregiver for a loved one. Due to the limited representation of participants who identified with a minoritized race, race was dichotomized into Persons of Color or White to determine any potential racial impact on the dependent variable. Cohort year was dichotomized as “yes or no” for Cohort 2026 (first-year students). Because second- and third-year student responses displayed minimal variability, this dichotomy allowed for analysis of impact of first-year participants who had not yet engaged in clinical learning within the curriculum. The attitudes scale was not used due to limited variability of survey responses. The statistics for included regression variables are found in Table 4.5.

**Table 4.5***Statistics for regression variables*

| Variable   | Mean | Std. Deviation | Minimum | Maximum |
|--|------|----------------|---------|---------|
| Perceived Knowledge (breadth scale)              | 5.20 | 2.45           | 0.00    | 8.00    |
| Perceived Skills (breadth scale)                 | 3.02 | 4.15           | 0.00    | 14.00   |
| Volunteer Experience                             | 1.52 | 0.75           | 0.00    | 3.00    |
| Male (yes = 1/no = 0)                            | 0.26 | 0.44           | 0.00    | 1.00    |
| Race (PoC = 1 or White = 2)                      | 1.72 | 0.45           | 1.00    | 2.00    |
| First Generation (yes = 1/no = 0)                | 0.28 | 0.45           | 0.00    | 1.00    |
| First year student (yes = 1/no = 0)              | 0.50 | 0.50           | 0.00    | 1.00    |
| Received PT care (self or family) yes = 1/no = 0 | 0.83 | 0.38           | 0.00    | 1.00    |

Pearson correlations, depicted in Table 4.6, were also analyzed to determine potential collinearity of variables. Perceived knowledge and skills demonstrated a moderate, positive linear relationship. This relationship was expected since knowledge was a presumed prerequisite for skills competence. Additionally, collinearity existed between volunteer experience and first year student status. These variables demonstrated a moderate, negative linear relationship, meaning first-year students were less likely to engage in volunteer experience compared with second- and third-year participants. A possible explanation for this finding relates to the curricular structure of this program and the timing at which participants engaged with the survey. First-year students were in the first semester of the program when they were immersed in anatomy coursework – a time-intensive and cognitively demanding workload. These first-year participants may not

have actively engaged in volunteer work as part of the DPT program because of their time and energy being focused on academic requirements. Conversely, at the time of study participation, second- and third-year students were afforded numerous opportunities to engage in volunteer work as part of the program's pro bono clinic and as part of the student association programming. It is possible that second- and third-year students' volunteer engagement was uniformly elevated as a product of the program culture.

**Table 4.6**  
*Pearson correlations for regression variables*

| Variables                           | Perceived Knowledge (breadth scale) | Perceived Skills (breadth scale) | Volunteer Experience | Male   | Race   | First Generation | First year student (Cohort 2026) | Received PT Care (self or family) |
|-------------------------------------|-------------------------------------|----------------------------------|----------------------|--------|--------|------------------|----------------------------------|-----------------------------------|
| Perceived Knowledge (breadth scale) | 1                                   | 0.480                            | 0.110                | -0.004 | -0.205 | 0.120            | -0.148                           | -0.227                            |
| Perceived Skills (breadth scale)    |                                     | 1                                | 0.117                | -0.132 | -0.003 | 0.147            | -0.276                           | 0.166                             |
| Volunteer Experience                |                                     |                                  | 1                    | -0.234 | 0.124  | 0.120            | -0.579                           | 0.159                             |
| Male                                |                                     |                                  |                      | 1      | -0.170 | 0.051            | 0.213                            | 0.059                             |
| Race                                |                                     |                                  |                      |        | 1      | -0.191           | -0.311                           | 0.192                             |
| First Generation                    |                                     |                                  |                      |        |        | 1                | 0.052                            | 0.013                             |
| First year student (Cohort 2026)    |                                     |                                  |                      |        |        |                  | 1                                | -0.031                            |
| Received PT Care (self or family)   |                                     |                                  |                      |        |        |                  |                                  | 1                                 |

The regression model, Table 4.7, reveals the relationships identified between the predictor variables and perceived skills competence. This model indicates that 39.2% of the variation in perceived skills competence is explained by the predictor variables taken together. The F statistic of 7.17 ( $p = .001$ ) allows for rejection of the null hypothesis that there is no relationship between the dependent variable and independent variables taken together. A statistically significant and robust positive relationship exists between perceived knowledge and perceived skills competence. This finding was expected as an increase in perceived knowledge is likely to translate to increased skill competence. All other things equal, every eight-point increase in perceived knowledge increased perceived skills by 0.87 points.

A positive and robust relationship was also identified between “Received PT Care (self or family)” and perceived skills. A possible explanation is that prior exposure to and experience with the PT profession positively impacted perceived skills while in the doctor of physical therapy program. All other things equal, for every one-point increase in “Received PT Care,” there was an increase of 3.45 points in perceived skills. Importantly, identification as a first-year student was negatively related to perceived skills when compared to second- and third-year students. Again, this is an expected relationship, as students presumably acquire greater perceived skills as they progress through the curriculum. All other things equal, identification as a first-year student detracted 2.42 points from perceived skills.

Non-significant predictor variables also tell an important story. Gender, race, and first-generation status all demonstrated no relationship with perceived skills. This finding suggests that perceived skills did not differ by gender, race, or first-generation status. One

interpretation is that students have an equitable perceived skills acquisition within this specific program regardless of individual demographic variables. An alternative interpretation is that while this program demonstrates greater racial diversity among its students compared to DPT programs nationally, the number of participants identifying as persons of color or minoritized gender identities may still have been too small to observe significant differences.

**Table 4.7**

*Regression model for perceived skills (breadth scale)*

| Model                               | B     | Beta  | t       |
|-------------------------------------|-------|-------|---------|
| Perceived Knowledge (breadth scale) | 0.87  | 0.51  | 5.37*** |
| Volunteer Experience                | -1.13 | -0.20 | -1.79   |
| Male                                | -1.37 | -0.15 | -1.56   |
| Race                                | -0.24 | -0.03 | -0.26   |
| First Generation                    | 1.14  | 0.12  | 1.35    |
| First year student (Cohort 2026)    | -2.42 | -0.29 | -2.51** |
| Received PT care (self or family)   | 3.45  | 0.32  | 3.36*** |
| Constant                            | -0.95 |       | -0.37   |

Dependent Variable: Perceived Skills (breadth scale)

R Square = .392; F = 7.17\*\*\*

\*p = .05, \*\*p = .01, \*\*\*p = .001

### *Qualitative Interview Results*

The qualitative interview data offers detailed participant perspectives to respond to research question two. The iterative coding process revealed a second theme that directly addressed research question two. This second theme (Learning about the problem: What learners bring with them and what they gain throughout the curriculum) was supported by three categories: 1) defining social and structural determinants of health; 2) personal experience, exposure, and reflection; and 3) the perceived impact of the DPT curriculum. The abbreviated code book for theme two is found in Table 4.8.

| <b>Table 4.8</b>   |   |   |
|--|---|---|
| <i>Abbreviated code book for theme related to research question two</i>  |   |   |
| Theme 2: Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum                       |   |   |
| Example Open/ Initial Codes (1 <sup>st</sup> cycle)  | Axial codes/ Categories (2 <sup>nd</sup> cycle)       | Representative participant quotes   |
| Access<br>Transportation<br>Education<br>Time as a resource<br>Prioritizing needs<br>“Spindle” or snowball effect<br>Chronic illness<br>Systemic/governmental barriers | Defining social and structural determinants of health | “There's a certain spindle effect - if somebody's transportation cancels, or the person who gives them a ride isn't available for a week, and they forget to cancel their appointments. And then they you know, no show for both appointments. Then they're put on a no-show list, and then it makes it even harder for them to get an appointment, and then they have to call the day of. So there's continued barriers set in place when certain determinants already interfere.” (P1 providing a clinic example of the impact of SDOH) |
| <i>Continued</i>   |   |   |

| <b>Table 4.8</b>   |   |  |
|--|---|--|
| <i>Continued</i>   |   |  |
| Exposure to “different people”<br>Learning to talk to people<br>Building empathy<br>Exposure to profession<br>Talking with peers<br>Feedback | Personal experience, exposure, and reflection | “So like for a lot of my life, I have been under the poverty line, on Medicaid, and so understanding that difficulty or having no health insurance at all, I just don't think there's a lot of people that understand what that really looks like for someone. But it has helped me not pigeonhole and expect someone to be at a certain level or receive certain healthcare [based on appearances].” (P7 reflecting on personal experience that shaped her understanding of SDOH) |
| Integrated clinical experiences<br>PRAPARE tool<br>Fostering empathy<br>Institutional environment/geography<br>Learning from peers           | Perceived impact of the DPT curriculum        | “And given the dynamic, the [local] community and all that's at stake here, like with gun violence, and just lower socioeconomic status amongst minority groups in the communities, and the opioid crisis, and all these other things that just kind of like hit [this] community all at once. I saw it first hand.” (P14 describing integrated clinical experiences within the neighborhood surrounding the institution/DPT program)  |

**Defining Social and Structural Determinants of Health.** Social determinants of health appeared to be well-understood by participants’ based on responses during the interviews. Participant 10, a second-year student, offered her understanding stemming from undergraduate coursework: “...we mainly were taught that there [were] five [social determinants]: it was education, social community, like the people that you know, your built environment meaning more where you live, your access to care, meaning more like if you have healthcare, and... also occupation.” First- and second-year participants provided consistent definitions and examples that reflected their general appreciation for

what social determinants of health look like for clients. For example, participant 12, a first-year student, offered her observations of a client's experience during her clinic shadowing hours prior to starting the PT program: "[The client] had chronic pain. So sometimes she just couldn't even physically get there. But because she was older as well, she wasn't able to drive easily. So she relied on family members who also had a very busy schedule, so she would miss a lot of appointments."

While these examples articulate the visible social factors that impact the individual client, meaningful appreciation of systemic and structural determinants of health was less common. Participant five, a third-year student who discussed experience within a government-funded health system for indigenous populations, highlighted the responsibility of the practitioner as an advocate for addressing structural factors when stating:

Access to nutrition is a huge one for this population - like historically going back decades - because of things like access to land and water irrigation because it affects farming and trickles down to governmental interventions, and then leading to unhealthy body weights, and like obesity levels and diabetes. So, having to be aware of our science history, and not just access to what we can provide, but what access they have outside of our system, and how we have to work and combat some of those barriers to be able to advocate for them as well.

These comments speak to the awareness of systemic barriers that must inform how practitioners approach plans of care and interventions for clients and communities. As detailed in Table 4.8, participant one also commented on the snowball or "spindle" effect of barriers to care and how multiple circumstances spiral to restrict access to needed services. These third-year students were the only participants who explicitly discussed structural or system-level determinants of health, whereas other participants described

more visible or tangible social determinants of health that are frequently attributed to the individual client.

**Personal Experience, Exposure, and Reflection.** Half of the interview participants noted a marginalized aspect of their identity, and six of those with marginalized identities cited lived experiences as factors contributing to their awareness and understanding of social and structural determinants of health. A poignant example of this data came from interview participant 14:

I identify as a cisgender, African American woman. And I think there's already an inherent privilege being a cisgender woman or a cisgender person within the healthcare space. But something that I feel like has been working against me was just being an African American and then also being a woman.

This data sample highlights the impact gender, race, and intersectionality on interactions with the health care system. This impact may not have been captured by the survey questions, which focused on beliefs and behaviors as a practitioner, rather than as a client. This participants' perceptions alluded to well-documented health care disparities for individuals from marginalized communities (Benkert et al., 2019, Crear-Perry et al., 202; Jackson & Garcia, 2014).

Another key example of the impact of personal experience was offered by interview participant five, a male, third-year student:

I have been interacting with people from other countries, not just like Mexico, Canada, but from across countries, across continents, and I think that's always made me aware that there are differences between us. We can come together, but being aware that there are differences, we have to address those differences and be able to individualize how we interact with people and how we respect other people.

This data sample highlights the importance of identity, personal experience, and exposure as factors in understanding social and cultural implications on relationships. These factors

are crucial for appreciating the relationships between health care practitioners and their clients. These sentiments were echoed by other participants. Participant seven, a second-year female student, shared personal details that influenced her perspective:

So, like, for a lot of my life, I have been under the poverty line, on Medicaid, and so understanding that difficulty or having no health insurance at all, I just don't think there's a lot of people that understand what that really looks like for someone. But it has helped me not pigeonhole and expect someone to be at a certain level or receive certain healthcare [based on appearances].

Beyond personal experience, most participants (nine out of 14) also discussed the value of working with individuals who were different from them, which helped foster their empathy for people who may be facing barriers, such as access to care, lack of insurance, financial constraints, and transportation challenges. Participant two, another second-year female student, articulated the value of interpersonal interactions: “I just feel like everyone should work in some type of customer service job, because I think it's helped me a lot with now being in PT school, when it comes to rapport with patients and talking to people that you don't know.” Similar comments from other participants supported this idea of practice and exposure in various working environments as beneficial for connecting with diverse people, which facilitates a positive client-practitioner relationship. This concept complements the participants’ quotes that informed theme one, discussed above, regarding the importance of recognizing SDOH and building trust and rapport with clients.

**Perceived Impact of the DPT Curriculum.** The impact of the DPT curriculum was also evident in participants’ comments. All participants described various exposure to and experience with SDOH prior to starting the DPT program, but second and third year participants explicitly detailed numerous DPT curricular elements that further

contributed to their understanding and application of these concepts. These findings supported the quantitative data which revealed a lack of skills confidence among first-year DPT students and a developing skills competence among second- and third-year students.

Two of the three first-year interview participants demonstrated superficial or limited understanding of SDOH concepts. One first year student (interview participant nine) identified competing priorities to maintain health but did not elaborate on potential uncontrollable factors that may prohibit reprioritization of health and wellness. He commented: “Like, why would I go on a run, or something like that, when I have other things to do, especially in undergrad? But now I feel like I'm more mature and realizing that I do need to focus on that.” This student cited academic responsibility as a detractor for maintaining his own exercise program, but he did not discuss factors outside of his own lens (e.g., lack of access to safe outdoor space, which is a concern within the community in which this DPT program is situated). Another first-year student (interview participant 12) identified environmental accessibility barriers within the context of a strictly physical impairment. She described visiting a shore town and observing a disconnect between accessible parking and the wheelchair access point to the boardwalk: “[A wheelchair user] would have to get out of the car, go over the curb, go to the other side of the road and then get on the ramp. That just makes no sense. They did not plan that accordingly.” These students portrayed a general awareness of barriers to health and wellness but did not engage in discussion specific to the multitude of factors that influence access to and utilization of resources essential for health.

The third first-year interview participant (interview participant four) described an extensive volunteer and service-learning background prior to starting the DPT program. This participant described meaningful and impactful experiences that offered exposure to the complexity of factors that define social determinants of health. This observation is consistent with other second- and third-year participants who provided rich descriptions of life experiences that fostered their understanding of SDOH. Among the three first-year participants, life experiences appeared to inform the depth of their understanding of social and structural determinants of health as they were beginning their DPT education.

Second- and third-year interview participants consistently offered rich descriptions of social determinants of health, including what they are and the implications for clients and communities. Third year students, who were completing their first full-time clinical education experience during data collection, demonstrated additional capacity to apply SDOH concepts across diverse clinical environments. These participants described the lessons that they took away from their clinical opportunities integrated within the curriculum (i.e., pro bono clinic, community clinics, and trauma hospital/acute hospital experiences) and how they applied that knowledge in their full-time clinical experiences. Participant thirteen articulated the impact of her learning that she carried with her throughout her three years in the program:

They're all [clinical] settings where you're gonna see people with various contributing factors, whether I've seen a patient who was shot, who is now not going to return to where they were living because of that, or patients who are homeless or who don't have family support or, like, accessibility to equipment or things that they need. And then you see people who have struggled with transportation and ability to get to PT or who are so focused on other things and people and taking care of things in their life that PT is not a priority.

As detailed in Table 4.8, participant 14 also described the impact of the institution's geography on her awareness and understanding of SDOH. Beyond geography, participant six cited her peers' openness with their own lived experiences as enlightening:

Even just having some other students talk about different things - has really opened my eyes to things that I was, like, Ohh! I didn't realize that this happens. This is a problem. This is an issue. Because I haven't experienced it, and I haven't seen it - or maybe I have seen it, and I just don't know.

Among the interview participants, third-year students exhibited greater capacity for reflection on their own behaviors and knowledge, perhaps due to their extended time in clinical settings compared to other participants. Their comments alluded to the concept of transformative learning described by Doobay-Persaud et al. (2019), that included application and critical assessment of insights gained from experiential learning opportunities.

This reflective capacity stood in contrast to first and second-year participants who equated reflection with external validation of performance. Participant nine, a first-year student, specifically cited good grades as an indicator of knowledge and performance, and participant eight, a second-year student spoke about feedback from professors as a driver of what she needed to improve or acknowledgement of what she was doing well. This growth trajectory parallels the findings described by Danzl et al. (2019) and Furze et al. (2015) which suggests that learners require time and development to understand and apply knowledge in complex situations. Similarly, meaningful reflection appeared to be influenced by clinical and community exposure among these study participants. Participant 10, a second-year student, detailed her reaction to her first client interview during an integrated clinical experience at the hospital:

That was a really intimidating conversation because what if they say they don't have a home and this is the first time we're figuring it out, and I freeze because I'm like, you know, that's something I really can't comprehend from my own life and it makes me very upset. So being able to have that conversation..., that's definitely an experience that was very helpful.

This participant demonstrated valuable reflection as she recognized the contrast between her client's experience and her own. The concept of cultural humility demands internal reflection to evaluate one's own position and privilege among diverse community members (Centers for Disease Control and Prevention, n.d.). These participants' comments indicate that meaningful reflection may not occur until later in clinical training. Third-year interviewees demonstrated a capacity for critical self-reflection that included not only personal growth, but also consideration of the impact of their actions on the communities they were serving. Participant one noted intentional reflection as a regular part of her practice: "I feel like I'm always looking at things through the lens of inclusion. [I]t just feels like something that's in in the forefront of my brain, partially from [the DPT] curriculum, partially from my life experience." This comment underscored the ability to look at clinical situations from the perspective of the client's benefit rather than personal gain.

Less experienced student clinicians in this study suggested learning engagement that was more focused on markers of individual achievement (e.g., grades, validation from instructors). Learners with more clinical background (third-year students) demonstrated an ability to embrace difficulty. Participant 13, a third-year female student, spoke of the importance of challenge to allow for growth: "The whole point... it's uncomfortable conversations, right? There are things that are challenging, so I think having those opportunities to challenge yourself to do it are important." This student

verbalized an appreciation for learning despite discomfort and uncertainty that contrasted comments by first- and second-year students.

Across the interview participant pool, comments were consistent with the survey data that indicated a positive attitude regarding the importance of SDOH and a growing competence with respect to knowledge and skills. All participants articulated foundational knowledge of SDOH as a concept, with third-year students offering rich description and application of SDOH content and deep personal reflection on their position as a health care practitioner. Application of SDOH concepts was informed by personal experiences, integrated clinical experiences within the curriculum, and exposure to the local community in the institution's geographic area.

### **Additional Analyses**

#### ***Curricular Impact: Attitudes***

To further explore how awareness of and perceived competence in social and structural determinants of health change across the curriculum, ANOVAs were run for each item within question groups for attitudes, perceived knowledge, and perceived skills by year in the program (see Appendix E). The question group for attitudes included 12 behaviors that participants rated on a four-point Likert scale from “strongly disagree” to “strongly agree.” Only one item (item 17.11 in Appendix E) demonstrated significance by year in the program ( $F = 3.41, p = .04$ ). This item (I acknowledge my own potential biases, including but not limited to, biases about body size, ability levels, educational levels, gender identity, race and ethnicity, and religion), was the only introspective question in the “Attitudes” question group. All other items were outward focused on

others, for example: “I am interested in volunteering,” “I am vested in the needs of others,” and “I respect the values of others, even if they are different from my own.”

First year students scored higher on item 17.11 compared with second year students, who demonstrated a lower average score. Third year students also rated themselves highly. Without the clinical experience to reflect on the impact of bias in the clinical setting, first year students may have overestimated their ability to acknowledge their personal biases. Second year students with more clinic experience within the DPT curricular context may have had more insight regarding the impact of bias in the clinic setting, and thus they rated themselves more critically. Third year students were immersed in clinical practice on a full-time basis and may have had more time to reflect on and remediate potential biases. This experience may also have afforded more comfort and greater accuracy of reflecting on these behaviors among third-year participants.

This hypothesis was supported by qualitative data from third-year participants who not only identified examples of bias in the clinic, but also acknowledged their own responses or discomfort. Participant thirteen cited discomfort with uncertainty when preparing to work with an adolescent client with physical and cognitive disabilities: “...will I be able to do anything, like, how will this go? And before I met them, it was more out of nerves, like, this is nerve racking and a complex patient, and then I figured out things to do. And it's definitely creative and challenging.” As a third-year student, this participant embraced the learning experience to overcome uncertainty and find solutions for this “complex patient.”

### ***Curricular Impact: Knowledge and Skills***

ANOVA for the eight knowledge-specific behaviors were run using Likert scale responses ranging from “not at all competent” to “extremely competent.” Surprisingly, no significance was identified by year in the program for any items (see Appendix E). Participants perceived an overall good knowledge base regarding social and structural determinants of health. Due to a limited representation of second- and third-year survey participants, the effect of curriculum progression may not have been detected by this method of analysis. The multivariate regression discussed earlier in this chapter may have been a better tool for capturing the relationship of both knowledge and cohort as predictors of perceived skill.

Additionally, first year students may have overestimated their knowledge as a product of the summer course content in which they were engaged at the time of this survey distribution. Year one, summer one courses specifically addressed some of the knowledge items from the survey, such as item 18.1: “I recognize potential barriers to an individual’s health, including but not limited to, societal, structural, community, and individual barriers;” and item 18.5: “I understand social and structural determinants of health and their impact on the health and wellness of individuals and communities” (see Appendix E). Students actively engaged in curricular content may have drawn connections between that content and the survey questions before they had opportunities to genuinely synthesize and apply that content in real time.

The ANOVA for perceived skills questions by year in program yielded 13 out of 14 significant items using Likert scale responses as described above. The only item that did not achieve significance was item 19.4: “I consistently educate individuals and

communities about evidence-based nutritional recommendations to promote healthy eating.” Participants may have perceived this item to fall outside the scope of practice of a physical therapist since this item aligns with nutrition. This item resulted in a marginally significant between group difference with  $F = 2.72$   $p = .07$ . All other items demonstrated between group significant differences, either  $p = .01$  or the  $p = .001$  (see Appendix E), with first-year participants scoring the lowest on perceived skills for all 13 significant items.

Qualitative data identified specific curricular activities that promoted participants knowledge and skills. All second- and third-year participants identified their integrated clinical curriculum as an invaluable resource for addressing social determinants of health in the clinical environment. They described their practice and implementation with the PRAPARE™ tool (Protocol for responding to and assessing patients’ assets, risks, and experiences, The National PRAPARE™ Team, 2022) as critical to their understanding. They expressed appreciation for the concrete guidance afforded by this screening tool that helped shape client conversations around SDOH. Participant five summarized the impact of not only the integrated clinical curriculum, but also the institution’s geography for his learning:

Especially in the environment that the program is in, it is wildly necessary to address social determinants and using things like the PRAPARE tool, exposing students to these concepts in these difficult conversations.... having the slight exposure, and then more time to really dive into those larger discussions within an entire course series, I think, was really valuable.

This comment parallels the comments from other participants who also noted the value of the integrated clinical courses to provide exposure and support significant learning. Community clinical experiences in the program’s pro bono physical therapy clinic, a

local community clinic, and the institution's hospital, which is an urban, level one trauma center, were consistently described as positive learning experiences that not only improved knowledge and competence, but also bolstered confidence.

### ***Impact of Demographics and Experiential Characteristics***

To address the ways in which demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health, additional ANOVAs for survey responses pertaining to attitudes, perceived knowledge, and perceived skills were analyzed by gender identity, race, and first-generation status. Subtle and important differences were observed.

For attitudes, one item (17.9 in Appendix E) achieved significance ( $F = 2.73$ ,  $p = 0.05$ ) when assessed by gender identity, with participants who identified as female or "other" viewing this item more favorably. This item (I am vested in the needs of others), reflected attention to the welfare of others. Female interview participants supported this finding with comments such as, "...we came into this - hopefully, we all came to this position - to help people, like health practitioners in general. So we have to try and tailor our care to all of our patients and all our patients are not the same" (interview participant two). Participants who identified as first-generation status conversely rated item 17.9 less favorably ( $F = 6.31$ ,  $p = 0.01$ ). Qualitative data did not shed light on this finding. A possible explanation may involve a necessary independence and individual drive to overcome challenges to make it to and through graduate school among first-generation students.

ANOVA for perceived knowledge did not reveal significant differences by gender or first-generation status for any of the eight items in this category. Interestingly, two

items demonstrated significant differences by race with Persons of Color reporting greater perceived knowledge as compared to White participants. These two items were: 18.7 (I know how to access population health data to inform plans for disease prevention and health promotion) and 18.8 (I recognize clients' potential need for services outside of my own scope of practice, specifically mental health services and social services). Significance for these items (18.7 and 18.8 in Appendix E) were  $F = 4.83$ ,  $p = .03$  and  $F = 5.64$ ,  $p = .02$ , respectively. Interview participant 14, who identified as an African American female, supported this data. She spoke of the need to look beyond her own clinical skills to meet the needs of her clients:

Not only are we calling out what is impacting this individual's health outcomes, but how can we make sure that we're providing them the resources that they need. And how can we make sure that we're referring them to the right teams to ensure that they have the utmost outcome that pertains to their situation?

A possible interpretation of these findings is that a minoritized identity and personal experiences articulated by this participant may have resulted in increased awareness of the need for health promotion, mental health, and social services.

No significant differences between groups were identified by ANOVAs for perceived skills when assessed by gender identity, race, or first-generation status. This outcome complements the findings from the regression model that suggests participants achieve perceived skills competence equitably, regardless of gender or racial identities. As noted in the qualitative data discussions throughout this chapter, this quantitative finding does not belittle the impact of identity and experience on understanding of SDOH, but rather supports the idea that the DPT program in which this study took place does not contribute to knowledge or skill disparity among its students based on race or gender identity. Similarly, no significant differences were identified by first generation

status, although one item achieved marginal significance. Item 19.12 in Appendix E (I consistently incorporate stress-management strategies as a component of health promotion for individuals and communities) yielded marginal significance ( $F = 3.39, p = 0.07$ ). Participants who identified as first-generation status reported higher levels of competence with this item. A possible explanation is that first-generation students who have had to navigate more challenges in accessing education may be better equipped to incorporate stress management strategies for their clients. This hypothesis warrants further exploration.

### ***Work and Volunteer Experience***

An important element of participants' responses both within the survey and to interview prompts involved their work experiences and their exposure to the physical therapy profession. Cross tabulations for clinical work vs volunteer experience did not yield significant findings for a potential relationship between clinical work and volunteering. Interestingly, nonclinical work experience demonstrated a significant relationship with volunteering. A potential explanation may include an acquisition of time management skills while balancing a work schedule. This experience may afford graduate learners the confidence to allocate more time to service activities. Additionally, engagement in paid clinical work may offset the obligation to participate in volunteer service activities since clinical workers may feel that they are already fulfilling a service role. These findings are displayed in Table 4.13. The numeric column headings of "0" through "3" represent the number of responses to which participants indicated "yes" to volunteer experience. A lack of volunteer experience for the category is indicated by "0", and "1" through "3" correspond to the number of yes responses for volunteer work prior

to or during the DPT program and/or serving as an unpaid caregiver to a family member or loved one. A total of 86 respondents were analyzed for each category of clinical and non-clinical work.

**Table 4.13**

*Frequencies and Chi-Square results for work experience and volunteering*

| Work Type   |     | Volunteer Experience |           |           |         | $\chi^2$ |
|-------------|-----|----------------------|-----------|-----------|---------|----------|
|             |     | 0                    | 1         | 2         | 3       |          |
|             |     | N (%)                | N (%)     | N (%)     | N (%)   |          |
| Clinical    | No  | 4 (4.7)              | 12 (14.0) | 17 (19.8) | 4 (4.7) | 3.45     |
|             | Yes | 2 (2.3)              | 24 (27.9) | 20 (23.3) | 3 (3.5) |          |
| Nonclinical | No  | 3 (3.5)              | 2 (2.3)   | 0 (0.0)   | 0 (0.0) | 24.11*   |
|             | Yes | 3 (3.5)              | 34 (39.5) | 37 (43.0) | 7 (8.1) |          |

\*p < 0.001

Note. N = 86

Qualitative findings reflected the value of all work experiences, whether clinically based or not. Most participants described prior or current work in service industries, such as waiting tables, or retail work. These participants consistently identified the benefit of learning to talk to people who came from backgrounds different from their own and obtaining more confidence with navigating challenging conversations. Participants noted that clinical work provided exposure to the physical therapy profession and greater comfort with medical terminology.

***Experiences with the Health Care System***

As noted in the regression, personal experience with physical therapy as either the client or the loved one of a client had a positive impact on perceived skills competence.

The open-ended survey items that allowed participants to share their perspectives and experiences as clients within the healthcare system offered additional context. Open-ended responses were coded to identify trends that were associated with positive factors vs negative factors with specific health professions (e.g., physical therapists, physicians, nurse practitioners, mental health specialists). Positive factors included feeling heard or validated, feeling a connection with a practitioner, building rapport with a practitioner, perceiving individualized or tailored treatment, and perceiving non-judgmental treatment. One survey respondent wrote about the care for a parent: “The physical therapist had an easygoing and welcoming personality and was there every step of the way to explain things to my parent.” These results echoed participants’ interview statements that emphasized connectivity with clients as a facilitator of optimal health care.

Negative experiences with the health care system were defined by a lack of continuity of care with the same practitioner, perception of a practitioner’s bias or judgment, lack of validation from a practitioner, and the failure of a practitioner to recall key details on follow up appointments. One participant identified negative experiences with other health care practitioners as “too many to count... from not feeling heard or believed to such brevity of inquiry you feel unimportant.” These findings offered additional explanation for the participants’ interview comments that reflected awareness and understanding of the harm inflicted by bias and the benefit of connection and rapport between a client and practitioner.

### **Research Question Two Summary**

Research question two explored the impact of both curricular characteristics and participants’ demographics and experiences on their attitudes, perceived knowledge, and

perceived skills competence regarding social and structural determinants of health. Quantitative data used multiple regression to identify predictor variables for perceived skills competence. ANOVA and cross tabulations detected impact of year in the curriculum and demographic characteristics on responses to sample beliefs and behaviors. Regression indicated that perceived knowledge, receiving physical therapy (either self or a loved one), and first-year student status explained 39.2% of the variance in perceived skills competence. ANOVA captured interesting details regarding variation in attitudes by cohort, gender identity, and first-generation status and variation in knowledge by race. Specifically, an item indicative of introspection was rated highest by third year students. This data was supported by the qualitative findings, which suggested an evolution of reflection based on the cohort year of the participants. Knowledge items that indicated the capacity to recognize the need for services beyond the scope of physical therapy were rated higher by participants of color. Again, qualitative data reflected that participants of color possessed a rich understanding of the needs of the communities that they were serving.

### **Conclusion**

This study explored doctor of physical therapy (DPT) students' perceived knowledge and skills competence specific to social and structural determinants of health. Use of a survey, which was developed from existing public health and wellness competencies and perceptions of serving the underserved (Crandall et al., 1993; Magnusson et al., 2020), provided the data for the quantitative arm of this mixed methods study. In depth, semi-structured interviews with a subset of participants representing each cohort of DPT learners provided the data for the qualitative arm of this study.

Quantitative findings revealed that learners hold positive attitudes toward social and structural determinants of health and recognize the importance of these concepts for optimizing health care. While depth scales for attitudes displayed limited variability, depth scales for survey items regarding perceived knowledge and skills showed greater variability. Participants' responses suggest that they perceive that they are developing competence in these areas. Regression analysis further explained the factors that influenced perceived skills competence. Knowledge gained across the curriculum and being the recipient of physical therapy positively influenced perceived skills competence. First-year student status (cohort 2026) was negatively associated with perceived skills competence. ANOVA for survey items specific to attitudes, perceived knowledge, and perceived skills competence provided further insight into differences by cohort and subtle and specific differences by gender identity, race, and first-generation status.

These findings were supported by participants interview comments, which fell into two primary themes: 1) Learners' perceived importance of social and structural determinants of health and factors that impact how to address them; and 2) Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum. These themes added context to the quantitative data and supported findings of differences by cohort year.

All participants demonstrated at least a foundational understanding of social determinants of health. Data suggested that first year students exhibited awareness of visible barriers to care, such as physical restrictions or transportation challenges. In contrast, third year students demonstrated a rich understanding of the complexity that drives social and structural barriers to health. For some participants, this understanding

was derived from personal experiences. Second- and third-year participants noted specific curricular elements, such as integrated clinical coursework, as foundational for understanding social determinants of health and allowing translation of knowledge across clinical settings.

As reflective practice is an essential component of cultural humility, questions about reflection were woven into the interview protocol. Reflection was described by first- and second-year participants as a process for individual skills growth and was dependent on external feedback and validation. This conflicts with the concept of cultural humility, in which the practitioner should reflect on their own position and privilege in the context of serving communities. Third-year participants exhibited a deeper reflective practice that considered the practitioner's position within the context of clinical care.

With the growing recognition of the importance of upstream social and structural factors on downstream health conditions, health professions training programs are responsible for preparing clinicians to understand and address these factors. This study provides insight into doctor of physical therapy students' attitudes and perceptions of competence regarding social and structural determinants of health. This study highlights aspects of the DPT curriculum and individual characteristics that inform learners' knowledge and capacity to address potential social risks within the clinical context. The following Chapter Five details the implications, limitations, and future opportunities regarding this research.

## **CHAPTER 5**

### **DISCUSSION AND CONCLUSION**

#### **Summary of Findings**

This study explored students' perceptions of competence in addressing social and structural determinants of health (SDOH). A doctor of physical therapy (DPT) program housed within a college of public health in an urban neighborhood served as the study site. As this program is embedded within an underserved geographic area and the college mission statement emphasizes cultural humility as a pillar of clinical training, this site provided a valuable lens for understanding the perceptions of learners who are attracted to this institution and the impact of learners' characteristics and curricular elements on those perceptions. Mixed methodology was used to answer the specific questions, which were:

1. How do current doctor of physical therapy students self-evaluate and perceive their preparedness (attitudes, knowledge, and skills competence) to address social and structural determinants of health (SDOH)?
2. How do personal and/or educational/curricular factors impact students' awareness of and competence in addressing social and structural determinants of health?
  - a. Sub question: How does awareness of and perceived competence in social and structural determinants of health change across the curriculum?
  - b. Sub question: In what ways do demographics and experiential characteristics affect students' awareness and perceived competence with respect to social and structural determinants of health?

The findings from the survey results and participants' interviews complemented each other and offered insightful responses to the research questions. Survey data, which was initially analyzed using depth and breadth scales for Likert scale responses, revealed important trends in question categories for attitudes, perceived knowledge, and perceived skills competence with SDOH. Results for assessment of attitudes displayed limited variability with overwhelmingly positive responses to sample beliefs. This finding suggested that this institution attracts learners who are aware of and hold positive attitudes toward the role of social factors in health and wellness for populations. Greater variability in responses to perceived knowledge and perceived skills competence indicated that learners view their competence as developing in these areas.

Multivariate regression analysis along with ANOVA for questions related to attitudes, perceived knowledge, and perceived skills competence, and cross tabulations for work and volunteer experience all yielded significant results. Regression demonstrated that perceived knowledge, receipt of physical therapy services, and first-year student status predicted perceived skills competence specific to SDOH. Perceived knowledge demonstrated a positive relationship with skills, which was expected since knowledge is a presumed prerequisite for skills competence. Being a recipient of physical therapy services or having a loved one who received physical therapy services also had a positive relationship with skills competence. Open ended survey question responses provided insight into this finding in that participants reported specific practitioner behaviors that corresponded to positive perceptions of care. These positive associations included a sense of connectivity with practitioners, perceptions of validation of reasons for pursuing care, and perceptions of non-judgmental treatment. These experiences may

have bolstered perceived competence with exhibiting these same behaviors as a clinical student.

ANOVA results demonstrated subtle but important differences in participant responses based on cohort year, gender identity, race, and first-generation status. ANOVA for question items pertaining to attitudes revealed significance for one item, which was introspective and addressed reflection on personal biases. First-year and third-year students rated themselves highly with second-year students indicating more critical self-evaluation. Participants' interview responses shed light on this trend. First-year students demonstrated limited depth of critical self-reflection and perhaps limited understanding of the concept of constructive self-critique regarding bias. Third-year students demonstrated meaningful self-critique and thoughtful reflection on their role and impact as culturally humble practitioners. Second-year students' lower ratings may have reflected an increasing awareness of the impact of bias in the clinical setting with decreased confidence or limited experience in overcoming those biases.

Additional ANOVAs detected differences in some attitude items based on gender identity. Female and "other"-identifying participants rated higher agreement with being invested in the needs of others compared with male and gender fluid participants. Importantly, perceived knowledge and perceived skills competence did not differ by gender, which supports the idea that perceived knowledge and skills acquisition happened equitably across participants, regardless of gender identity. A limited number of male interview participants restricted the ability to compare these quantitative findings with qualitative data; however, female interview participants' comments supported the idea of being invested in the needs of others.

A notable difference emerged with two knowledge items based on race. These items reflected the ability to navigate resources and to recognize the need for services beyond one's own scope of practice. Participants who identified as Persons of Color rated these items with greater perceived competence than White participants. Two interview participants who identified as Persons of Color supported this finding by articulating their desire to identify resources to meet clients' multi-disciplinary needs. Both participants spoke of the need for access to mental health services and social services for issues such as housing and nutrition. Items for skills competence did not differ by race, which also supports that skill acquisition occurred equitably among participants in this DPT program. One item that potentially differed by first-generation status achieved only marginal significance. This item was related to implementation of stress management strategies, which may be explained by a capacity to overcome barriers that are frequently experienced by first-generation students.

Further quantitative analysis of participants' experiences involved cross tabulations for reported work and volunteer experience. These findings suggested a relationship between non-clinical work and volunteering and no relationship between clinical work and volunteering. One interpretation of this result was that learners who participate in clinical work may feel less obligated to volunteer since they are already engaged with the community through clinical practice. All interview participants noted the value of their work experiences prior to and during PT school, and second- and third-year participants specifically identified volunteer and curricular activities that shaped their understanding of social and structural determinants of health.

This study's findings were validated by the congruence of quantitative analyses with qualitative interview responses. The interview participants' comments were coded via an iterative process and themes were identified in concordance with the research questions. The two themes that emerged from initial and categorical rounds of coding were: 1) Learners' perceived importance of social and structural determinants of health and factors that impact how to address them; and 2) Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum. Interview participants' comments that aligned with theme one were shaped by axial categories of: 1) professional responsibility and accountability; 2) recognition of bias and privilege; and 3) barriers and facilitators to taking action with respect to social and structural drivers of health and wellness. Axial categories that aligned with theme two were: 1) defining social and structural determinants of health; 2) personal experience, exposure, and reflection; and 3) the perceived impact of the DPT curriculum.

### **Limitations**

Several limitations impacted this study. Potential differences across cohorts of students may have resulted in differences in survey results across the three curricular time points. This possibility clouds the differences attributed to curricular impact. While statistical methods to assess collinearity minimized this issue, future research should take a longitudinal approach to resolve this limitation. Conversely, an advantage of including three different cohorts of students was avoidance of repeated testing, which could have posed a potential threat to internal validity with a true longitudinal design.

Additionally, self-selection bias was a plausible concern. Students with a strong personal interest in SDOH may have been more inclined to participate in this work. The DPT program director encouraged survey participation from all students in the program

through repeated email announcements to mitigate this issue. Purposive sampling of interview participants was also planned to address this concern; however, interview participant volunteers reflected a diverse representation of student demographics and cohorts without additional sampling strategies. Another limitation was that students who selected to attend a program within an urban college of public health focused on health equity and cultural humility may not have represented the general population of DPT students. Contamination should also be considered, as students within a single program often study and socialize across cohorts. Discussion of survey and interview content among participants may have influenced participants' responses. This concern was addressed by bounding the time in which the survey was available as well as the time in which interviews were conducted.

A statistical limitation involved a small participant pool and an even smaller pool of individuals with minoritized demographic variables, such as race and gender identity. Persons of Color was an aggregate category of racial minorities, which did not capture the potential impact of curriculum and lived experiences on unique or specific groups. Further statistical limitation included the gender of the participants. The population of students from which participants were drawn was 63% female, and this participant sample was 72.1% female. With an overrepresentation of female students, interpretations of the lack of impact of gender on participants' perceived knowledge and skills competence may have been skewed.

The author and researcher for this study was also a faculty member in the program that served as the study site. An existing academic relationship between the researcher and the participants may have resulted in potential bias during data analysis. Attempts

were made to mitigate this concern via consistent reflexivity practiced by the primary researcher and by peer validation of both qualitative and quantitative analyses. Memos and written reflections during the multi-stage qualitative coding process along with researcher peer consensus of thematic development supported validity of the qualitative findings. Collaboration with a statistician/mentor, who was part of the study advising committee and unaffiliated with the program serving as the study site, supported validation of the quantitative analysis.

Future research should explore trends in perceptions of competence regarding SDOH across multiple institutions to allow for a larger sample, disaggregation of demographic variables, and detection of the impact of diverse institutional characteristics. As this study investigated the perceptions of students at one program of physical therapy, generalization to other health professions programs and institutions is limited. This study serves as an example for investigating these concepts and may inform expanded study designs that capture multiple institutions, diverse groups of learners, and multiple health professions.

### **Implications for Practice**

The statistical analysis and the participants' open-ended survey responses and interview comments in this study shed light on the curricular and individual student characteristics that support application of population health concepts. With the aim of serving populations, health professions training programs may benefit from exploring how learners are using curricular content to inform clinical practice. This study provides insight on that process for learners in a doctor of physical therapy program in an urban setting and in a college of public health with a cultural humility focus. The population

health framework (Dunn & Hayes, 1999), which recognizes upstream social and structural drivers of health, complements the cultural humility framework (Tervalon & Murray-Garcia, 1998), which advocates for the recognition of “sociocultural mismatches” between practitioners and clients. The participants in this study exhibited the application of the population health framework as they described a need for knowledge of and access to resources to address systemic barriers to health. They also articulated culturally humble practice in the descriptions of their clinical encounters, particularly in their recognition of the impact of the relationship between a practitioner and a client.

Identification of effective learning activities is crucial for learners’ understanding and application of complex social and structural drivers of health. The participants’ comments within this study suggested that this program successfully teaches and/or attracts learners who understand the implications of social factors, structural factors, and the potential harm of practitioner bias. These study participants described many aspects of their learning that shaped their understanding of SDOH - specifically, targeted discussion and reflection throughout the integrated clinical coursework and community service-learning opportunities within the hospital, pro bono, and community clinic settings. Threading these activities throughout the curriculum may bolster learners’ application of complex material within different contexts and in different stages of professional development.

The participants in this study also noted modeling (both their own modeling of behaviors and modeling from clinical instructors) as a facilitator of learning and reflection. The idea of modeling corresponds directly with equity competencies promoted

by the Association of American Medical Colleges (AAMC, 2022). Given the two-sided nature of modeling described by these participants, educational strategies should embrace a give and take approach between clinical educators and clinical learners and between clinicians and clients. This give and take may be especially impactful when navigating cross-cultural relationships between individuals with diverse social identities. Participants in this study cited classroom simulated activities and discussion of difficult topics as positive preparatory exercises to foster culturally humble behaviors in the clinic.

Inclusion of reflection and feedback is also important for professional development and development of cultural humility. The participants in this study displayed a graduation from seeking external validation to formulating self-awareness. This trend, which is evident in other literature (Furze et al., 2015), warrants structured implementation to better facilitate accurate reflection earlier in the curriculum. Zhou and Louie (2022) provide a framework for this process that begins with thoughtful creation of learning objectives and proceeds in a cyclical pattern with identifying resources, applying changes, and reflecting on clinical encounters. Third-year learners in the present study exhibited remarkable self-awareness and reflective capacity, but application of a framework, such as the one described by Zhou and Louie (2022), may accelerate professional growth and provide learners with structured goals for reflection.

The participants also articulated the need for consistent practice with discussing and navigating difficult situations and awareness of available resources as critical tools for competence. Participants' comments across time points in this study suggested an evolution of their capacity for meaningful reflection regarding their position, privilege, and abilities as health care practitioners. Similarly, the ability to recognize the influence

of social and structural factors among clients seemed to evolve. Participants described empathy and connection with clients as a foundation of effective care, but they also hoped for more concrete or specific tools and resources to address clients' needs. Experiential learning allowed students to engage with the community, but participants felt unprepared to intervene when social barriers emerged during client interactions. Student development of a bank of local and community resources may serve as an effective learning tool for helping clients navigate social and structural challenges.

As noted throughout health professions literature, humility is a journey rather than a destination (AAMC, 2022; Tervalon & Murray-Garcia, 1998). Transformative learning experiences are one method for fostering this humility, and clinical experiences in community service-learning environments may fulfill these learning expectations. As programs consider implementation of competencies and accreditation standards related to population health and wellness, consideration of both learners' experiences and client outcomes is necessary. Formative assessment opportunities may help to shape learners' understanding of complex SDOH concepts without the threat of a potentially negative impact on grades. This formative approach may also foster genuine, constructive self-critique among learners because of less emphasis on the consequences of summative assessments. Striking a balance with learner accountability is also essential since clients and communities are directly impacted by learner preparedness. Educational design should intentionally include and engage students and solicit community input. Ultimately, learners must appreciate the impact of their words, actions, and decisions on the communities that they serve. Perhaps a greater emphasis on this community connection throughout health professions training will prove more effective than a standardized

exam. Connections between student performance and client outcomes are needed to support or reject this hypothesis.

### **Future Directions for Research**

Professional associations and accrediting bodies acknowledge the need to include social and structural determinants of health in training, and work is underway to revise curricula and reprioritize content. However, the typical voices driving educational decisions (i.e., academic and clinical faculty, students, employers) may not provide the comprehensive insight or innovation required to meet societal needs. Glaringly, community and patient perspectives are absent from the decision-making table (ACAPT, 2022). As these critical perspectives are not overtly described in existing literature, an intentional effort to obtain community input and to study curricular impact on patients and populations must coincide with curricular reform.

The participants in this study praised engagement and collaboration with their community through local community clinics as pivotal for their learning, but what works for this program may not work across institutions. The specific geography of this institution emerged as a prominent characteristic that shaped participants' perspectives on client interactions. Future research should explore diverse institutional settings that account for variable community demographics (e.g., urban and rural) and institution type (e.g., traditional in-person, on-line, hybrid). Additionally, academic and clinical partners need to identify mutual goals for a symbiotic relationship that benefits clinical students and the clinical site. As identified by Rich et al. (2020), each player must know their role in the system for all participants to benefit. Opportunities exist for academic programs to

collaborate with clinical partners to both meet learning objectives and serve clinical sites and community needs.

Future research inquiries should also investigate whether competencies are addressing the needs of diverse client populations and whether academic expectations are matching the needs of diverse learners, diverse clinical settings, communities, and populations. Development and implementation of transformative learning practices, such as community-based service-learning (Leaune et al., 2021), case study implementation and practice (AAMC, 2022; Molitor et al., 2021) and opportunities for reflection and feedback (Furze et al., 2015; Young et al., 2020) may help with synchronization of community and learner needs. Intentional curricular design and assessment of curricula and learners' performance should extend beyond the classroom and consider learners' ability to apply and address upstream health factors in the clinical setting. Greater numbers of institutions, both academic and clinical, and greater numbers of learner participants will enable more robust statistical analysis to make more informed decisions about curricular reform. Focus groups with community members and students also hold promise for optimizing curricular efficacy. Academia needs to redirect its outcomes assessment to explore impacts on population health and wellness, rather than stopping short at student outcomes.

### **Conclusion**

With a growing focus on competency-based education within health professions training, explicit guidance for competencies specific to upstream drivers of health is an emerging topic in the literature. The Association of American Medical Colleges cites sources of health disparities (e.g., health care provider bias, being a member of a historically marginalized group, living in an underserved area) as they argue for the

responsibility of medicine “to address and mitigate the factors that drive racism and bias in health care and to prepare physicians who are culturally responsive and trained to address these issues” (AAMC, 2022, p. 2). The AAMC diversity, equity, and inclusion competencies offer a cross-disciplinary approach for implementation of social determinants of health and public health and wellness content in health professions curricula. Published competencies for population health and wellness promotion in physical therapy (Magnusson et al., 2020) inform additional expectations for allied health professions students and speak to the need for a more holistic approach to health care and clinical training. These competencies along with an assessment tool for identifying students’ perceptions of serving the underserved (Crandall et al., 1993) shaped the survey that was developed for this study.

Literature indicates that implementation of this content is varied and assessment of students’ knowledge on these topics is limited. This study identified curricular characteristics and students’ demographic variables that contribute to students’ perceptions of SDOH at one urban doctor of physical therapy program. The study identified that learners develop their perceived skills competence with respect to social and structural determinants of health as they progress through their training. Interview data further identified community clinical learning experiences as a primary impact on learning. This integrated clinical coursework targeted training around social and structural determinants of health and occurred across five semesters of a nine-semester curriculum. This consistency may have fostered learners’ appreciation for the importance of SDOH content in clinical care.

These study participants cited the responsibility and accountability of physical therapists to address social needs; however, participants felt uncertain about how to act on the social concerns that they identified with their clients. The complexity of social and structural barriers to health warrants adequate resources and interprofessional intervention. There is a need to continue looking upstream and training health care practitioners to think upstream to address social and structural contributors to health and wellness. The participants in this study offered important insights into how this upstream focus shaped learners' perceptions at this urban institution. Learners cited consistency and scaffolding of content discussed in the classroom and then applied in the clinic as impactful.

Health professions have a long way to go to achieve cultural and racial congruence between their workforce and the communities they serve. A shorter-term solution to benefit populations includes holistic health professions training that fosters empathy and awareness of the social, structural, and systemic drivers of health and wellness. The data from this study does not justify a prescription for a specific educational model, but these findings provide an example for what is working at this institution to train a culturally humble work force.

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## **APPENDIX A**

### **SURVEY: PERCEPTIONS OF SOCIAL AND STRUCTURAL DETERMINANTS OF HEALTH**

Survey: Student Perceptions of Clinical Care Factors

Description: This survey is anonymous and seeks to capture participants' demographics and attitudes, perceived knowledge, and skills specific to factors impacting clients' care. The survey is expected to take about 15 minutes to complete. This information will be reported in aggregate and will not be used for any other purpose. While participants are encouraged to answer all questions, there is no penalty for choosing not to answer some questions. You may exit/withdraw from the survey at any time. Following completion of the survey, participants will be directed to a separate link where they can voluntarily provide contact information (decoupled from their survey responses to maintain survey anonymity) for participation in a virtual interview to further explore perceptions regarding factors that impact health.

Q1 What is your year in the Doctor of Physical Therapy Program?

- Year 1 (Class of 2026)
- Year 2 (Class of 2025)
- Year 3 (Class of 2024)

Q2 What is your gender identity?

- Cisgender female
- Cisgender male
- Non-binary
- Transgender female
- Transgender male
- Gender fluid
- Prefer not to say
- Other

Q3 What is your age in years?

- 20 - 22
- 23 - 25
- 26 - 28
- 29 - 31
- 32 or older

Q4 With what race(s) and/or ethnic group(s) do you identify? Select all that apply.

- Black or African American
- Caribbean
- Asian or Asian American
- Middle Eastern or Arab
- Pacific Islander or Native Hawaiian
- Native American or Alaskan Native
- Hispanic, Latino/Latina, Latinx, or Spanish
- White (Caucasian or European)
- Prefer not to answer
- Other \_\_\_\_\_

Q5 Are you a first generation college student? (First generation means that neither of your parents graduated from college.)

- No
- Yes

Q6 Have you filed a FAFSA (applied for financial aid) as a graduate student?

- No
- Yes

Q7 What is your language proficiency? As defined by Marian et al. (2007), language proficiency includes literacy, grammatical competence, vocabulary, and conversational ability in a given language. Please indicate additional languages in the open text boxes.

English only

English and one other language (bi-lingual)

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English and multiple other languages (multi-lingual)

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Q8 Do you identify as a member of the LGBTQ+ community?

No

Yes

Prefer not to answer

Q9 Do you identify as a person with a disability (physical, mental, and/or cognitive)?

No

Yes

Prefer not to answer

Q10 Please select the most relevant response regarding your clinical/health care-related work experience (paid employment). You may select more than one answer if appropriate.

- I worked as a rehab aide or in another clinical/healthcare role prior to PT school
- I have worked as a rehab aide or in another clinical/healthcare role while in PT school
- I have not had paid clinical work experience
- Other \_\_\_\_\_

Q11 Please select the most relevant response regarding other work experience (paid employment) outside of health care both prior to and during PT school.

|   | Full time             | Part time             | No paid employment    |
|---|-----------------------|-----------------------|-----------------------|
| I have been employed outside of health care prior to PT school                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am currently employed or have worked outside of healthcare while in PT school | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q12 Please select the most relevant response regarding any prior or current caregiving, service, or volunteer work (unpaid service).

|  | No                    | Yes                   |
|--|-----------------------|-----------------------|
| I participated in service or volunteer work prior to PT school   | <input type="radio"/> | <input type="radio"/> |
| I currently participate or have participated in service or volunteer work, either within the DPT program or in my community while in PT school | <input type="radio"/> | <input type="radio"/> |
| I have served as an unpaid caregiver to a family member, friend, or loved one, either prior to PT school, while in PT school, or currently     | <input type="radio"/> | <input type="radio"/> |

Q13 Have you, any of your family members, or a loved one ever received care from a physical therapist (PT)?

No

Yes

Display these questions, if yes.

Q13b If yes, please describe any specific positive experiences related to the physical therapy episode of care.

---

Q13c If yes, please describe any specific negative experiences related to the physical therapy episode of care.

---

Q14 Have you, any of your family members, or a loved one ever received care from a medical doctor, a physician assistant, or a nurse practitioner?

|                     | No                    | Yes                   |
|---------------------|-----------------------|-----------------------|
| Medical doctor      | <input type="radio"/> | <input type="radio"/> |
| Physician assistant | <input type="radio"/> | <input type="radio"/> |
| Nurse practitioner  | <input type="radio"/> | <input type="radio"/> |

Display these questions, if yes.

Q14b If yes, please describe any specific positive experiences related to the episode of care.

---

Q14c If yes, please describe any specific negative experiences related to the episode of care.

---

Q15 Have you, any of your family members, or a loved one ever received care from an allied health professional other than PT (e.g., mental health professional, occupational therapist, speech language pathologist, social worker)?

|                             | No                    | Yes                   |
|-----------------------------|-----------------------|-----------------------|
| Mental health professional  | <input type="radio"/> | <input type="radio"/> |
| Occupational therapist      | <input type="radio"/> | <input type="radio"/> |
| Speech language pathologist | <input type="radio"/> | <input type="radio"/> |
| Other                       | <input type="radio"/> | <input type="radio"/> |

Display these questions, if yes.

Q15b If yes, please describe any specific positive experiences related to the episode of care.

---

Q15c If yes, please describe any specific negative experiences related to the episode of care.

---

Q16 Rank order the following factors based on importance in clinical decision-making for a physical therapist. Click and drag to order 1 as most important and 10 as least important.

- \_\_\_\_\_ Current functional mobility level and use of mobility aides or assistive devices
- \_\_\_\_\_ Past medical/surgical history
- \_\_\_\_\_ Current medications (prescribed or over the counter)
- \_\_\_\_\_ Employment status
- \_\_\_\_\_ Reason for referral to physical therapy
- \_\_\_\_\_ Primary means of transportation
- \_\_\_\_\_ Family/friends/other sources of support
- \_\_\_\_\_ Access to physical space for exercise
- \_\_\_\_\_ Access/proximity to a grocery store (not a convenience store)
- \_\_\_\_\_ Access to stable housing

Q17 For the following questions, rate your level of agreement with respect to each statement.

|  | Strongly disagree     | Disagree              | Agree                 | Strongly agree        |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. Physical therapy services should be available to all members of the community, regardless of an individual's financial resources or insurance status. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. Physical therapy services should be available to all members of the community, regardless of an individual's citizenship or immigration status.       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. Access to resources to maintain health and wellness should be a priority for federal funding programs.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. Physical therapists have a professional responsibility to provide pro bono services to individuals and communities that are underserved by the health care system.

5. Physical therapists have a responsibility to engage in community health efforts.

6. Physical therapists should advocate for community-based education about healthy behaviors (e.g., smoking cessation, alcohol moderation, sleep hygiene, stress reduction).

7. During my DPT education, I have a personal responsibility to provide pro bono services to individuals and communities that are underserved by the health care system.

8. Within my DPT education, I am interested in volunteering in pro bono clinical and community programs that provide physical therapy services to underserved communities.

9. I am vested in the needs of others.

10. I respect the values of others, even if they are different from my own.

11. I acknowledge my own potential biases, including but not limited to, biases about body size, ability levels, educational levels, gender identity, race and ethnicity, and religion.

12. Mutual trust between a physical therapist and the individual or community receiving services is essential for societal health and wellness.

Q18 For the following questions, rate your level of competence or knowledge with respect to each statement.

|   | Not at all competent  | Developing Competence | Competent (entry level) | Extremely competent (expert) |
|---|-----------------------|-----------------------|-------------------------|------------------------------|
| 1. I recognize potential barriers to an individual's health, including but not limited to, societal, structural, community, and individual barriers.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 2. I recognize risk factors for chronic disease and understand how these factors impact an individual's function, participation, and quality of life.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 3. I understand the constructs of behavior change theories (e.g., Social Cognitive Theory or the Transtheoretical Model) and how these can be applied to evidence-based education and interventions for individuals and caregivers. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 4. I understand the concept of population health and my role (as a physical therapy student) in addressing health and wellness, disease prevention, and health promotion.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 5. I understand social and structural determinants of health and their impact on the health and wellness of individuals and communities.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |

6. I am able to identify health indicators (e.g., physical activity, educational level, socioeconomic status, and the built environment/neighborhood) and understand their role in monitoring population health.

7. I know how to access population health data (e.g., CDC) to inform plans for disease prevention and health promotion.

8. I recognize clients' potential need for services outside of my own scope of practice, specifically mental health services and social services.

Q19 For the following questions, rate your level of skill competence with respect to each statement or indicate if you have not had the opportunity to practice this skill.

|   | No opportunity        | Not at all competent  | Developing competence | Competent (entry level) | Extremely competent (expert) |
|---|-----------------------|-----------------------|-----------------------|-------------------------|------------------------------|
| 1. I consistently implement evidence-based health promotion with all clients and communities.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 2. I consistently provide screening in community or clinical settings using evidence-based health promotion and prevention resources.                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 3. I am an informed member of the interprofessional health care team that effectively addresses and reduces disease risk factors for individuals and communities. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |
| 4. I consistently educate individuals and communities about evidence-based nutritional recommendations to promote healthy eating.                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/>        |

5. I consistently educate individuals and communities about the value of movement and exercise to improve health and reduce disease risk.

6. I consistently utilize community resources to promote healthy behaviors (e.g., physical activity, stress reduction/management, sleep hygiene, smoking cessation) for individuals and communities.

7. I consistently provide information regarding health promotion, wellness, and healthy behaviors while respecting an individual's needs regarding their personal values, beliefs, and communication needs.

8. I consistently assess individuals' and communities' health assets,

risks, and goals, including assessment of environmental factors on health and wellness.

9. I consistently adapt evidence-based interventions based on individual assets, risks, and goals to optimally meet individual and community needs.



10. When developing and implementing health promotion interventions, I consistently acknowledge and respond to health disparities experienced by marginalized and underserved communities (e.g., communities of color, socioeconomic disadvantage, or disparities related to gender, gender identity or disability status).



11. I consistently incorporate knowledge of social and structural determinants of health into interventions to address disease prevention and health promotion.

12. I consistently incorporate stress-management strategies as a component of health promotion for individuals and communities.

13. I consistently refer clients to appropriate resources for mental health and social services, as needed.

14. I consistently communicate and follow up with members of the interprofessional team to close the loop on clients' concerns.

Q20 Would you be willing to speak in more detail with the primary researcher regarding the topics covered in this survey?

- No
- Yes
- Unsure

Feedback Please provide any additional feedback, comments, or suggestions about the Temple DPT program here.

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Q21 Thank you for participating in this survey. Please click the forward arrow to submit your responses. Your responses are anonymous. You will be automatically directed to a decoupled link to provide your contact information (optional) for participation in an interview.

## APPENDIX B

### INTERVIEW PROTOCOL

Student perceptions of competence in addressing SDOH

Participants will be provided with the informed consent (see attached) prior to participation in the interview.

This project is designed to explore student perceptions of competence in addressing social and structural determinants of health (SDOH). Interview data will be collected through audio recording, will be transcribed, and de-identified to protect participants' confidentiality. Participants may choose a pseudonym or one will be created for them. Participation in this interview is voluntary and participants are free to withdraw from the interview at any time. Participants are free to decline to answer any question during the interview. Participants will be provided with findings/analysis obtained from the interview process and will be asked for feedback about the outcomes. Providing feedback on findings, known as member checking, is also voluntary for participants.

Questions:

1. What year are you in the physical therapy program?
2. Please describe your work experiences prior to starting the program. It's ok if you have not had extensive work experience.
  - a. Other than financial benefits, what else did you gain from those experiences?
3. How would you define "social and structural determinants of health?"
4. Which personal factors (e.g., aspects of your personal experiences or identity) have influenced your awareness SDOH?
  - a. Potential follow up: Is there anything else about your experiences that you want to share that may influence your awareness of SDOH?
5. Could you provide an example – either one you encountered in the classroom or one you encountered in real life – in which you were aware of social and/or structural determinants of health and the potential impact on a client? It's ok if you can't think of an example.
6. Curricular activities:
  - a. What specific learning activities in the program alerted you to the concept of SDOH?
  - b. How did those activities impact your understanding or awareness of SDOH?
  - c. How do you engage in reflection on your learning? Formal course assignments? Independent activities?
    - i. (Potential prompt: "Tell me more about \_\_\_\_\_" based on participant's response)
  - d. Have you received any formal training regarding recognition of individual biases? If so, what was that training like and how did it impact your learning? Your clinical care?

- e. Is there anything else about the curriculum that you want to share?
7. Please describe the clinical environments where you have been placed so far within the program.
    - a. What settings/clinical environments have you been in?
    - b. How did those environments influence your understanding of SDOH?
    - c. How do you engage in reflection in the clinical setting?
    - d. How did you acknowledge or respond to potential biases experienced in the clinic - either your own, another clinician's, or a client's?
  8. How has the program prepared you to address SDOH in the healthcare environment?
    - a. If you feel that the program has not prepared you, what suggestions do you have that may help with better preparing students to address and acknowledge SDOH?
  9. Do you feel that physical therapists have a responsibility to address SDOH in a healthcare or clinical setting? Please explain.
  10. If you identify social or structural barriers to health for a client, how would you address these issues in a clinical setting?
    - a. (Potential prompt: "Tell me more about \_\_\_\_\_" based on participant's response)
  11. Is there anything else you would like to share about your personal or academic/clinical experiences specific to awareness of or competence in addressing SDOH?

**APPENDIX C**  
**CURRICULAR MODEL**

**First Year**

| Summer Semester (1)  | Fall Semester (2)  | Spring Semester (3)   |
|--|--|---|
| Human Anatomy<br>Teaching, Learning, and<br>Group Dynamics<br>Introduction to Physical<br>Therapy*<br>Clinical Examination &<br>Intervention Skills 1* | Functional Biomechanics<br>Human Physiology &<br>Pathology 1<br>Clinical Examination &<br>Intervention Skills 2<br><br>Evidence-based Practice 1<br>Integrated Clinical<br>Experience 1* | Neuroscience<br>Human Physiology &<br>Pathology 2<br>Motor Control & Motor<br>Learning<br>Clinical Examination &<br>Intervention Skills 3<br>Clinical Electrophysiology<br>& Biophysical Agents<br>Integrated Clinical<br>Experience 2* |

**Second Year**

| Summer Semester (4)   | Fall Semester (5)  | Spring Semester (6)  |
|---|--|--|
| Development Across the<br>Lifespan<br>Clinical Management of<br>Musculoskeletal Conditions<br>1<br>Clinical Management of<br>Neuromuscular Conditions<br>1*<br><br>Integrated Clinical<br>Experience 3* | Psychosocial Aspects of<br>Care*<br>Clinical Management of<br>Musculoskeletal Conditions<br>2<br>Clinical Management of<br>Neuromuscular Conditions<br>2*<br>Clinical Management of<br>Cardiopulmonary<br>Conditions*<br>Bioethics*<br><br>Evidence-based Practice 2<br>Integrated Clinical<br>Experience 4* | Management and Health<br>Care Systems<br><br>Medical Diagnostics<br>Clinical Management of<br>Musculoskeletal Conditions<br>3*<br><br>Management of Medically<br>Complex Patients*<br>Pharmacotherapeutics<br>Clinical Management of<br>Pediatrics<br>Integrated Clinical<br>Experience 5* |

**Third Year**

| Summer Semester (7)                | Fall Semester (8)   | Spring Semester (9)                |
|------------------------------------|---|------------------------------------|
| Full-time Clinical<br>Experience 1 | Clinical Pain Sciences<br>Assistive Technologies<br>Evidence-based Practice 3<br>Special Topics*<br>Electives (Vestibular,<br>Musculoskeletal, Pediatrics,<br>Geriatrics)<br>Full-time Clinical<br>Experience 2 | Full-time Clinical<br>Experience 3 |

\*Courses that include Social and Structural Determinants of Health content

**APPENDIX D**

**QUALITATIVE CODEBOOK**

| <b>Theme 1: Learners' perceived importance of social and structural determinants of health and factors that impact how to address them.</b>   |  |
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| <b>Open/Initial Codes<br/>(1<sup>st</sup> cycle)</b>  | <b>Axial Codes/ Categories<br/>(2<sup>nd</sup> cycle)</b>                            |
| Advocacy<br>Holistic care<br>Responsibility<br>Time with clients<br>Trust<br>Client autonomy<br>Situational awareness<br>Practitioner as advocate<br>Respect<br>Inclusion<br>Modeling behavior<br>Student modeling for CI<br>CI modeling for student  | Professional responsibility and accountability                                       |
| Nonjudgement<br>Stigmatized language<br>Privilege:<br>affluence = access<br>personal privilege<br>Cultural bias<br>Racial bias<br>Religious bias<br>Personal bias: ageism<br>Undergrad health professions and work-specific training<br>Uncertainty as a source of bias<br>Healthcare worker bias/desensitization | Recognizing bias and privilege   |
| Shell shocking clinic environment<br>Cognitive load<br>Clinic pace<br>Agency as a student<br>Empowering clients<br>Professional autonomy<br>Community education   | Barriers and facilitators to addressing social and structural determinants of health |

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| Resources:<br>identification or lack of<br>wasted resources<br>Building client trust<br>Client/therapist cultural congruence<br>Problem-solving  |   |
| <b>Theme 2: Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum.</b>   |   |
| <b>Open/Initial Codes<br/>(1<sup>st</sup> cycle)</b>   | <b>Axial Codes/ Categories<br/>(2<sup>nd</sup> cycle)</b> |
| Undergraduate coursework (health professions)<br>Access<br>Access = better outcomes<br>Transportation<br>Education<br>Time as a resource<br>Work schedule<br>Impact of work on health<br>Communication challenges<br>Prioritizing needs<br>“Spindle” or snowball effect<br>Chronic illness<br>Systemic/governmental barriers<br>Equity/inclusion                         | Defining social and structural determinants of health     |
| Leadership training<br>SDOH vocabulary<br>Sensitivity and inclusion training<br>Family dynamics<br>Exposure to “different people”<br>Service industry work<br>Learning to talk to people<br>Connecting to people<br>Building empathy<br>Exposure to profession<br>Work ethic<br>English as second language<br>Identifying big takeaways<br>Notebook to track preparation | Personal experience, exposure, and reflection             |

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| <p>Clinic as context<br/> Thinking about how to improve<br/> Talking with peers<br/> Talking with social network<br/> Feedback from professors<br/> Seeking validation<br/> Looking for guidance<br/> Reflection without feedback: not helpful<br/> Importance of collaborative learning/care</p>   |   |
| <p>Integrated clinical experiences<br/> PRAPARE tool<br/> Promotion of holistic care<br/> Clinical application<br/> Low stakes opportunities/safe learning spaces<br/> Teaching Learning and Group Dynamics<br/> Inconsistent recall<br/> Consistent language/messaging<br/> Practicing “uncomfortable conversations”<br/> Fostering empathy<br/> Learners’ desire for challenge and problem-solving<br/> Theoretical discussion vs application<br/> Community engagement<br/> Institutional environment/geography<br/> “And then what?”<br/> Learning from peers</p> | <p>Perceived impact of the DPT curriculum</p> |

## Expanded Codebook with Representative Data

| <b><i>Theme 1: Learners' perceived importance of social and structural determinants of health and factors that impact how to address them</i></b>  |  |  |
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| <b><i>Open/Initial Codes (1<sup>st</sup> cycle)</i></b>  | <b><i>Axial Codes/ Categories (2<sup>nd</sup> cycle)</i></b> | <b><i>Data Examples</i></b>  |
| Advocacy (P5, 10)<br>Holistic care (P2, 3)<br>Responsibility<br>Time with clients (P5, 8)<br>Trust (P5, 6, 8)<br>Client autonomy (P3, 7, 13)<br>Situational awareness (P5, 8)<br>Practitioner as advocate (P5)<br>Inclusion (P1)<br>Respect (P4, 13)<br>Modeling behavior<br>Student modeling for CI (P1, 6, 14)<br>CI modeling for student (P9, 10, 11) | Professional responsibility and accountability               | <p>“It’s our job. Like, you know, we came into this - hopefully, we all came to this position - to help people, like health practitioners in general. So we have to try and tailor our care to all of our patients and all our patients are not the same. So we need to make sure we know our full patient and all the things that make them them.” (P2)</p> <p>Client autonomy: “So you don't want to just be like, ‘It sounds like you're having a lot of trouble at home. I'm going to give you this resource.’ And asking if they even want it because they might not.” (P3)</p> <p>We have “more opportunity to advocate for our patients and to address more things than just what their physical therapy needs are.” (P5)</p> <p>“I think physical therapists have a very unique opportunity with how often we treat and see our clients, and more than most other health care providers, we get to see our individuals more often. We have longer conversations, we spend more physical time with them per appointment, and we get to know our clients on a more personal level than most other providers. And so we gain that trust.” (P5)</p> <p>“We're identifying these extra needs and these extra issues that you probably did not tell your doctor, or something came up more recently, but your next follow up with your doctor isn't for another 2 to 3 months. We get to then specifically</p> |

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|  |  | <p>push into other resources or advocate more because we are seeing things essentially in almost real time.” (P5)</p> <p>“I think we talk the most with our patients as clinicians compared to anyone else in the field, except maybe beside nurses. But I think we catch and hear... they just tell us things that they don't tell other people.” (P6)</p> <p>Client autonomy: “...trying to come in with a more neutral idea of, like, letting the person tell you what they need or don't need or have or don't have.” (P7)</p> <p>Situational awareness: “You always want to make sure you're like being appropriate in the situation. I don't want to just be like..., because I'm used to being overly friendly and like happy and stuff, so that's not always like what's going to be receptive. And you want to make sure you're there for what the patient needs and being aware of their social determinants.” (P8)</p> <p>“We do have at least like 45 minutes with our patients. Whereas other healthcare providers might only have like 15, and they're just getting through what they need to. They don't have time to really sit down. So with our course of care, I feel like our profession is so special that our clients really, like, ease in and are comfortable with us to be able to bring up these topics. Maybe if it's not on the first session, maybe if it's like towards the end or right before discharge, like we need to be well prepared to know how to respond.” (P8)</p> <p>“Here [in the local community] you are like focused and surrounded by all these problems that you have to address somehow because otherwise the situation will get worse and worse and worse and we don't want that. Because it's already bad.” (P11)</p> |
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|  |  | <p>Responsibility “to navigate a more holistic kind of approach to an individual's health.” (P14)</p> <p>“It might be sort of a responsibility of yours to help, but like it is ultimately their decision. You're just kind of giving them that, like, next step.” (P13)</p> <p>“Modeling everything feels useful. Yes, in terms of like empathy and compassion. And like, ‘how am I going to like include somebody in a certain setting - where I don't really have a lot of agency as like a student clinician?’” (P1, also addressing agency of the student clinician, which impacts ability to take action)</p> <p>“There have been PTs that have discussed, maybe like trying to create a unique plan for a patient who's not able to access certain types of care, or maybe set up a consultation because a patient cannot pay for a whole session.” (P4) – this participant also discussed attention to holding private conversations also demonstrating client respect</p> <p>Student modeling for clinician:<br/> Responding to perceived bias from a clinician: “I don't think I like ever outright said something to like another clinician, but I would just ask a question to the patient of like redirecting it a different way.... So I just would ask another question and be like I'm going this direction. Maybe you'll follow.” (P6)</p> <p>“There were a couple of times when maybe things were said about a person’s accent, you know, because English wasn't their first language, or saying things like “ohh well, you know, they're hard to understand anyways.” How would I address it? I would say, well, you know, sometimes I just said, “I don't mind having to ask a question twice if I need to or rephrase it.” (P14)</p> |
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|   |                                       | <p>“Comments such as, you know, if they were coming in three times a week like I had recommended, maybe they'd be further along in their recovery than they are right now. And then I would drop in, “Oh, well, you know, their copay is kind of high.” You know, being careful not to like cross too much of a boundary as a student, but also maybe bring in a new perspective.” (P14) – This also addresses agency as a student.</p>  |
| <p>Nonjudgement (P8)<br/>Stigmatized language (P13)<br/>Privilege: affluence = access (P4)<br/>personal privilege (P8, 10, 14)<br/>Cultural bias (P5)<br/>Racial bias (P14)<br/>Religious bias (P13)<br/>Personal bias: ageism (P4, 13)<br/>Undergrad health professions and work-specific training (P2, 5, 14)<br/>Uncertainty as a source of bias (P13)<br/>Healthcare worker bias/ desensitization (P5, 7)</p> | <p>Recognizing bias and privilege</p> | <p>“...trying not to, yeah, put a story on to someone that's not theirs.” (P3)</p> <p>Observation in external clinic as an aide: “things were maybe overexplained or underexplained and dumbed down” (due to assumptions about a client's age). (P4)</p> <p>Trained in a “patient communication framework system of being able to more effectively communicate with our patients, identify ourselves, identify our experiences, let them self-identify, communicate what we're doing, and let them communicate how treatment is going to affect them or what their questions are, and not just like making the assumption.” (P5)</p> <p>“I think a lot of [bias] comes from - as opposed to an awareness of how these cultures and details go - more of the over awareness. Like, [the clinicians] had been working with the community and this culture for so many years, it has created some of those assumptions.” (P5)</p> <p>Clinicians “kind of go in with a certain bias. Because they've worked at a place for long enough to know what type of situation they're walking into. So it's interesting because I think I try really hard to be on the opposite side, be extremely neutral and be like I am not going to assign what I think are my preprogrammed biases to what I would assume about this person. And instead actually hear a CI assign them and say listen, this is probably what you're walking into. And almost using them as a way to kind of guide</p> |

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|  | <p>the session which, like I don't know how that looks like one way or another, but it is interesting.” (P7)</p> <p>Personal privilege: “Looking at family dynamics throughout that weekend, working with the kids, it was interesting to see and take a step back with, like, normal things I take for granted - like financial stability and just being able to do normal daily things and like live my life and go to school like that. These kids and these families are struggling with that, are impacted from their health.” (P8 – also reflection on burden of chronic illness)</p> <p>“I would say that before I went to college, I really didn't know what social determinants of health were. That term probably didn't mean anything to me, and I didn't really know what it meant because I was very fortunate growing up that it was never something that I had to worry about. If I had to go to the doctor, like I have health insurance, my mom could pay the \$20 co-pay. She had a car to take me to the doctor, and it was never a problem in my personal life. Once I was exposed to it in college, I thought it was, like, one of the most important things to consider when you consider someone's healthcare.” (P10)</p> <p>Uncertainty: “...will I be able to do anything, like how will this go? And before I met them, it was more out of nerves, like, this is nerve racking and a complex patient, and then I figured out, you know, things to do. And it's definitely creative and like challenging.” (P13)</p> <p>“There can sometimes be a stigma around healthcare providers, and people are not always the most trusting, depending on previous experiences.” (P13)</p> <p>“...it first became like “a thing” like, oh wow, like if I don't say anything, if I don't advocate for myself and how I'm feeling, nothing's gonna get</p> |
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|   |   | <p>done. I have always heard of stories and the injustices that can be done to people of color within the healthcare system - just based off of stories that have been passed down from my family.” (P14)</p> <p>“The area in which I was doing my clinical was probably on the very affluent side of neighborhoods. So a lot of the patients that were coming in were probably more than likely well off and had an abundance of tools and resources and referral sources, and that kind of worked with them in their recovery and in their journey to better physical health.” (P14)</p>  |
| <p>Cognitive load (P1, 3, 5, 10, 11)<br/> Clinic pace (P3)<br/> Agency as a student (P1, 3)<br/> Empowering clients (P1)<br/> Professional autonomy (P5)<br/> Community education (P2, P5, 11)<br/> Resources: identification or lack of (P8, 10)<br/> wasted resources (P11)<br/> Building client trust (P5, P9, 13)<br/> Client/therapist cultural congruence (P1, 11)<br/> Problem-solving (P14)</p> | <p>Barriers and facilitators to addressing social and structural determinants of health</p> | <p>Cognitive load: “I feel like I'm kind of constantly reflecting, and at the same time like not trying to kill myself with so many things in terms of like time and energy, and my own resources.” (P1)</p> <p>Resources: “So it feels like in those particular scenarios, because of the like clinical situation I was in, I had resources to address those things because they were readily there.” (P1 referring to community clinics within ICE curriculum)</p> <p>Agency: “I feel like I address in the ways in which I have agency. I won't give people like 12 exercises to do at home. I'll give them like 3, you know, which feels like resources and time. And you know, the mom who came in with 4 kids - from what she told us - I don't think she wants to do 12 exercises at home. So it feels on a smaller scale, but it still feels relevant.” (P1)</p> <p>“I can't help somebody move if they can't get to me. I can't help somebody learn to walk again, if like, they can't understand my language. It feels very straightforward to me. I also can't expect somebody to come into my clinic who does not identify similarly to me, and trust me automatically, like, I also can't do that.” (P1)</p> |

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|  | <p>“Hey? Can I check in about something with you? I heard you say this. Can we talk about how that might impact your plan of care?” Like, I think sometimes just giving people space to do their own reflection is a huge opportunity to help someone.” (P1)</p> <p>Importance of community education: “And like to us, it's like common knowledge. But to them, they've never heard of these words before.” (P2)</p> <p>Limited capacity to act:<br/>     “I think we've done a good job of understanding what it is, how it can impact people and identify factors that could potentially play a role into their health care. I just am not really confident on how to address it yet.” (P2)</p> <p>“I definitely understand what they are and how they impact people. I just never really feel like I know what to do with them.” (P3)</p> <p>Clinic pace/cognitive load: “I think [our CI] did a good job of bringing us together and talking about how everything went and what impact that's gonna have for [the client] down the line, which was really nice, because then I got to kind of think about it a little more. Whereas sometimes in certain settings, when you're a little more fast paced, it's like, I don't really get to think about it too much.” (P3)</p> <p>Awareness of resources: “One of the practicals we had, there was a social component. I think it was in CEIS. And then, when we were talking afterwards, they said like, ‘Oh, you should really refer them to social work.’ And I'm like, I didn't even really think about social work. Like, I don't know much about it. So it's not something I would ever think through. So just being more aware of it.” (P4)</p> <p>Professional autonomy: “We have a lot of freedom in how we can treat, and the doctors</p> |
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|  | <p>give us that freedom to use our clinical judgments and be able to do whatever we need to do to treat our patients.” (P5, experience within a governmental health system)</p> <p>Cognitive load: “We jumped into the hospital acute care setting in our second or third semester the first year. It's very shell shocking, and we haven't had exposure to those concepts.” (P5, early sense of lack of preparation)</p> <p>Trust: “When clinicians come in from outside of that demographic there's a little bit of time that you also need to spend to gain trust from the client - and that takes time. And it takes awareness and learning and openness to allow each individual person to find their trust in you.” (P5)</p> <p>IP resources: “We could collaboratively work with other professionals who serve this population and specifically combat their barriers that we can identify and to advocate and specify their care. [This experience] has taught me to be more specific and to be more aware and to find those resources and provide them.” (P5)</p> <p>“It's very eye opening to see the lack of awareness that [the community doesn't] even know... that they, like, don't have access to all this stuff that they probably need for health. I always think, it's interesting, like say they have back pain and they didn't even know about physical therapy. And they're like, “oh wait, this could be helping?” Like they didn't even know that there's a solution out there for whatever they're dealing with.” (P8)</p> <p>“I feel like there's always a lack of resources and like so many problems we could be solving, but that's hard.” (P8)</p> <p>Cognitive load: “There's a lot of information that you're learning about patients: family life, home</p> |
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|  | <p>life, their financial situation. So it's definitely hard to unpack that all in the situation.” (P8)</p> <p>Relating to clients/ cultural congruence: “There were people in which English was not their first language, which I really liked a lot because I remember when I was at [the hospital], some of my classmates, they were struggling a little with understanding them. For some reason, since I have an accent, it's a bit easier for me to pick up on what they're saying. Even when I express myself, it's easier because I wouldn't use many typical American sayings.” (P11)</p> <p>Wasted resources: “It was three weeks ago, four weeks ago, we went to [community clinic]. We had a PT class and only three people showed up, which is a waste because now [community clinic], in comparison to [other clinic], is a much bigger place. It's in a more central area, so I would expect to see more people because it's free; because it's important; because it's [sharing] education. It's an excuse to move around. It's an excuse to meet new people. But despite that, there were still few people there.” (P11)</p> <p>Cognitive load: “When we go to pro bono, the professor, jumps in and provides the resources for the patient. We are not the first one who provide the resources, which I still appreciate that because, of course, sometimes I don't think about it because I'm more focused on, OK, I need to remember the skill from CEIS 1. So I need to do it properly. Of course like I am very involved and scared and like nervous about it.” (P11)</p> <p>Lack of Resources: “If I had to look at it from a volunteer kind of lens, it was definitely disheartening because we try to work with him to set him up with social services and given the convoluted history that he would give, it just made things even more difficult and, again, disheartening, because you really wanted to help this gentleman. I don't think that we had the tools</p> |
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|  |  | <p>to really help guide him through his living situations.” (P14)</p> <p>“We [could] have an [interprofessional] day where we talk about things that we would like to do and how we would like to grow as a community amongst us students and our faculty. And maybe that can help bridge the gap, like, maybe if we do have patients, such as this gentleman that we're picking up, it's an easier way to filter him to the right resources.” (P14)</p> <p>“Now the part-time clinical experience has forced me to not only become aware of [SDOH], but how to act upon them. So for example, at [the hospital], not only are we calling out what is impacting this individual's health outcomes, but how can we make sure that we're providing them the resources that they need? And how can we make sure that we're referring them to the right teams to ensure that they have the utmost outcome that pertains to their situation?” (P14)</p> <p>“I tried to Google a couple of things for them that they could do on their own. But maybe, I felt like I just needed a little bit more knowledge on how to make it a little bit more sustainable for them in like an actual for-profit clinic.” (P14)</p> |
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| <b>Theme 2: Learning about social and structural determinants of health: What learners bring with them and what they gain throughout the curriculum</b>  |   |   |
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| <i>Open/Initial Codes<br/>(1<sup>st</sup> cycle)</i>   | <i>Axial<br/>Codes/<br/>Categories<br/>(2<sup>nd</sup> cycle)</i> | <i>Data Examples</i>  |
| Undergraduate coursework (health professions) (P2, 4, 8, 9)<br>Access (P1, 12)<br>Access = better outcomes (P14)<br>Transportation<br>Education<br>Time as a resource<br>Work schedule (P6)<br>Impact of work on health (P8)<br>Communication challenges (P13)<br>Prioritizing needs (P2)<br>“Spindle” or snowball effect (P1)<br>Chronic illness (P7, 8, 12, 14)<br>Systemic/governmental barriers (P5)<br>Equity/inclusion (P1, 4) | Defining social and structural determinants of health             | <p>“There's a certain spindle effect - if somebody's transportation cancels, or the person who gives them a ride isn't available for a week, and they forget to cancel their appointments. And then they you know, no show for both appointments. Then they're put on a no-show list, and then it makes it even harder for them to get an appointment, and then they have to call the day of. So there's continued barriers set in place when certain determinants already interfere.” (P1)</p> <p>“I remember watching people [in the rehab gym]. There would be all these conversations happening at once, and people's, I mean again, my judgment, like availability to participate decline, or not be as enthusiastic as when they first walked in, which feels like a barrier, and feels somewhat like how determinants of health can influence a situation like that.” (P1)</p> <p>“...economic stability, educational access, work access, healthy living. Also like an environment that is safe and comfortable for you to grow in. I guess just a means that brings equity to all populations and serves the underserved as well in ways that fits their needs.” (P4)</p> <p>“Structural determinants of health I would deem as more like systemic</p> |

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|  | <p>barriers. So, either lack of access to providers, lack of access to health insurance coverage, and even as far up as like historical, geographic, and property barriers of where certain populations can live within cities. And that will also determine, like public transport, personal transport, job opportunities, how certain healthcare workers might interact within the setting for certain demographics just based on, like, racial/cultural assumptions or stigma. I think business structures and governmental systems have created additional barriers for certain individuals.” (P5)</p> <p>“Knowing that sometimes the only appointments that you can get are during a work day or during something that you already [planned]. So you're like - I have to give up something to be able to go to this appointment.” (P6)</p> <p>“If we have a very easy-going job with a bunch of great people that we work with and that doesn't cause a lot of stress, that could be great on your health, and it's something you enjoy. It could be great on health versus someone who works with a bunch of people they hate or has horrible hours... that could be negatively impacting your health.” (P8)</p> <p>Impact of chronic illness in children:<br/> “[The parents] have to rearrange their whole life. They have to like change what their job is and their hours - just the daily stressor that it is - that takes a toll on the parents. But they have to constantly put on the happy face for the kids. Even on the siblings - like it's hard to see their sibling go through that</p> |
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|  | <p>and that's probably like very impactful for them long term.” (P8)</p> <p>“I learned a lot about this in undergrad, and we mainly were taught that there [were] five: it was education, social community, like the people that you know, your built environment meaning more where you live, your access to care, meaning more like if you have healthcare, and finally, I think - What am I missing? - I said education, so also occupation would be it.” (P10)</p> <p>“We had a client in the clinic I worked at in this past who would miss a lot of appointments, and one: it was just because of her health in general. She had chronic pain. So sometimes she just couldn't even physically get there. But because she was older as well, she wasn't able to drive easily. So she also relied on family members who also had a very busy schedule, so she would miss a lot of appointments.” (P12)</p> <p>“I would define social and structural determinants of health as different aspects of an individual's life that can influence their health, or like the outcomes of their health as a whole. So anything from the minute details of how they grew up, all the experiences that they've had in adulthood, what's been passed down to them, what's new that they've obtained, and their life experiences, all of those things, and all those aspects influence their health outcomes.” (P14)</p> <p>“She's been suffering chronic pain all through her body for years at a time. And this is the first, or one of the first, places that she has felt like she's been</p> |
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|  |  | <p>heard. And I think a lot of that has to do with the fact that she doesn't have access to quality healthcare. English is her second language. So that language barrier - it already puts those at a disadvantage from not being able to understand fully the healthcare system and then health providers maybe not taking the time to explain that to them.” (P14)</p>  |
| <p>Leadership training (P13, 14)<br/> SDOH vocabulary (P1)<br/> Sensitivity and inclusion training (P5)<br/> Delivery method matters (P3)<br/> Family dynamics (P8, 9, 13)<br/> Exposure to “different people” (P5, 7, 10, 13, 14)<br/> Service industry work<br/> Learning to talk to people (P2, 3, 8)<br/> Connecting to people (P4, 6, 9)<br/> Building empathy (P2, 13)<br/> Exposure to profession (P4, 8, 10, 12)<br/> Work ethic (P5, 13)<br/> English as second language (P11)<br/> Identifying big takeaways (P10)<br/> Notebook to track preparation (P9)<br/> Clinic as context (P7, 8)<br/> Thinking about how to improve (P8)<br/> Talking with peers (P1, 13)<br/> Talking with social network (P7, 9)<br/> Feedback from professors (P8)<br/> Seeking validation (P6, 13)<br/> Looking for guidance (P4)</p> | <p>Personal experience, exposure, and reflection</p> | <p>“I don't feel like I actually used the word social determinants of health until I was in PT School, but my awareness of it I feel like came from like education, from school and undergrad - just without that language I would say.” (P1)</p> <p>“I feel like I'm always looking at things through the lens of inclusion, and not to like pat myself on the back, but it just feels like something that's in in the forefront of my brain, partially from [the DPT] curriculum, partially from my life experience.” (P1)</p> <p>“I think for me that experience from going from one [insured] to the other [uninsured], and that time with no insurance and not being covered, and then have to be like, “So I can't do that,” or just having conversations with my mom, she’s like, “Oh, I can't afford that” - those experiences opened up more of my understanding of how these factors do play into what people will get done or the help they will receive or not.” (P2 – empathy stemming from personal experience)</p> <p>Benefit of work experience: “I just feel like everyone should work in some type of customer service job, because I think it's helped me a lot with now</p> |

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| <p>Reflection without feedback: not helpful (P3, 7)<br/> Importance of collaborative learning/care (P5, 9)</p> |  | <p>being in PT school, when it comes to like just rapport with patients and talking to people that you don't know.” (P2)</p> <p>“So just generally working with people and being able to handle when they're not super friendly to you.” (P3)</p> <p>Working as PT aide: “that was mostly just to get my hands wet with just terminology in the PT world, and also kind of seeing some different kinds of patient populations.” (P4)</p> <p>“I gained a work ethic of being able to handle high volume, low volume, interacting with populations of multiple different demographic backgrounds. I would go from a small rural clinic to a very high-paced, large volume orthopedic clinic, and various degrees of social economic classes. So being able to interact with many different people of many different walks of life and getting perspectives of lots of different treatment styles from different therapists.” (P5)</p> <p>“I have been interacting with people from other countries - not just like Mexico, Canada, but from across countries, across continents - and I think that's always made me aware that there are differences between us. We can come together, but being aware that there are differences, we have to address those differences and be able to individualize how we interact with people and how we respect other people.” (P5)</p> <p>“I think I learned how to talk in front of large groups of people and just be able</p> |
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|  |  | <p>to naturally, like, hold conversations.” (P6)</p> <p>“I think personally struggling like with finances myself has made me like super aware that is costs a lot of money to go to doctor's appointments. So I'm like, do I want to pay for health insurance when I'm like - it's expensive?” (P6)</p> <p>“I didn't realize how much [SDOH] actually covered. So I didn't realize other things that it included, like race and gender, because that's not something that I think I ever really thought about myself. Because of where I grew up and what I was exposed to. I wasn't really exposed to a multicultural area. So coming to like Philly, I was like, oh, this is, this is very different. And I'm seeing a lot more things that I didn't know existed.” (P6)</p> <p>“I definitely learned a lot about, just like working with different types of people and how you interact with different types of people.” (P7)</p> <p>“So like for a lot of my life, I have been under the poverty line, on Medicaid, and so understanding that difficulty or having no health insurance at all, I just don't think there's a lot of people that understand what that really looks like for someone. But it has helped me not pigeonhole and expect someone to be at a certain level or receive certain healthcare [based on appearances].” (P7)</p> <p>Description of leadership training:<br/>“...it wasn't anything like, accusatory.</p> |
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|  | <p>It was just - if you think like this, it may be because of this. So just sort of informing why you may have these thoughts or these feelings towards things and then like maybe to encourage you to think about the other side.” (P13)</p> <p>“I’ve worked with individuals that were high school graduates, never graduated from high school, worked with individuals that had their Masters degree, worked with individuals that were single parents - you know, maintaining, you know, multiple children. I’ve worked with all different people, walks of life. So I definitely gained kind of more of a realistic perspective of how the world and the workforce can be - especially for those that didn’t have the opportunities to obtain higher education.” (P14)</p> <p>“I identify as a cisgendered African American woman. And I think there’s already an inherent privilege being a cisgender woman or a cisgendered person within the healthcare space. But something that I feel like has been working against me was just being an African American and then also being a woman. So the deep rooted history behind the injustices between like African Americans and the healthcare system, that’s one. And then two - even just Women’s Health is always an iffy area and still is to this day especially when it comes to gynecological kind of treatments.” (P14)</p> <p>“I personally just find it beneficial to get feedback from other people or just think of, like within the same situation,</p> |
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|  | <p>what other approaches could I have taken.” (P13)</p> <p>“Going through the social determinants of health P.R.A.P.A.R.E. tool with my classmates, and like, after we had done it with the person, going back and talking through it. And being like, okay, this thing is this, and this thing is that, and applying it in different places, or at least brainstorming how that might impact [the client]. So, yeah, that feels like how I apply my learning.” (P1)</p> <p>“I find more stock in individualized feedback, especially based on skills practicals or clinical rotations with supervisors or with professors because I find the application of our hands on concepts and our psychomotor skills within either simulated settings or actual clinical settings to be more valuable in my learning and my growth than sometimes written assignments or individual exams or individual questions. So I tend to take those comments with practical application more into my integration, or growth.” (P5)</p> <p>“Honestly just debriefing about it with my partner at home and being like, “You will not believe what I got to experience today.” So just being able to reflect on like a new experience... and like connecting it to be like - well, now I understand why we learned that.” (P7)</p> <p>Clinic as context: “We had a clinical experience where both of the patients at the hospital [had a total knee arthroplasty]. So when I was studying</p> |
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|   |   | <p>for the test for school, I was like, well, for some reason I'm not book learning it, but I remember what we did at the hospital. So I'm just going to try and use that. And it helped.” (P7)</p> <p>“We had to turn in those reflections for ICE class, and every time I'm like, this is not helpful. Like I'm just making stuff up to write. Like this is not what I want to write about. This is not what I got from it.” (P7)</p> <p>“Learning to be more comfortable in the physical therapy setting and trying to ask questions, like, to the extent of my little knowledge of physical therapy at the time, to try and be more engaged always and not take the time for granted. So always making the most of my time there.” (P8 – referring to pre-PT clinic shadowing hours)</p> <p>“Getting more reflection from my professors, specifically about specific things that I did, definitely helps let me know where I'm at. Yeah, like where I can improve.” (P8)</p> <p>Tracking learning: “I feel like I could have a notebook for, specifically, just like writing out my thoughts about, like, I just took an exam, like, talk about what my preparation before it went like, like, the barriers of me succeeding. Or the other way around - what I did good to do well on the exam and go forward with that same good.” (P9)</p> |
| <p>Integrated clinical experiences (all year 2 and 3 participants)<br/>PRAPARE tool</p> | <p>Perceived impact of the DPT curriculum</p> | <p>“It was talked about in a lot of different courses. I remember talking about it in Neuro and CEIS, as just like regular language that we use. But it feels like</p>   |

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| <p>Promotion of holistic care (P2, 8)<br/> Clinical application (P7)<br/> Low stakes opportunities/safe learning spaces (P13)<br/> Teaching Learning and Group Dynamics (P9)<br/> Inconsistent recall (P3, 13)<br/> Consistent language/messaging (P8)<br/> Practicing “uncomfortable conversations” (P13)<br/> Fostering empathy (P5, 8)<br/> Learners’ desire for challenge (P5) and problem-solving (P3, 14)<br/> Theoretical discussion vs application (P2, 5, 13, 14)<br/> Community engagement (P4, 8)<br/> Institutional environment/geography (P2, 4, 5, 7, 8, 11, 13, 14)<br/> “And then what?” (P14)<br/> Learning from peers (P6)</p> |  | <p>the ICE curriculum was where it was like “This is what it is. This is how we are looking at it. These are the tools that you can take. These are the steps that you can take.” That felt like it made it more concrete, to me, at least.” (P1)</p> <p>“Every time we have ICE, we’re talking about it. And we’re kind of like addressing those factors. But I mean, it’s making sure it’s inculcated in us that ‘Hey, these are important.’” (P2)</p> <p>Geographic environment: “‘Oh, there’s no like open space.’ And then you’re like, Oh, okay, how am I going to change my HEP to things that they can use. So I think again, our ICE experiences and as well as our ICE class, and what we discussed there, I think that helps address [SDOH].” (P2)</p> <p>Specific learning activity: “You really see why sometimes medical, or what you would believe are not pertinent medical issues, would be at the bottom of the list. Like, I have this bad knee, but I’m also struggling paying my rent, paying utilities, getting food and transportation. I also have kids and their expenses. My knee is not going to be at the top of my list. So I think that activity is something that stuck out to me because you start to understand why patients are not adherent, or even why PT is not always on the top of their list.” (P2)</p> <p>Impact of the PRAPARE tool: “We went over family, income, housing, transportation, support system, like all of that. So I think that’s the biggest tool</p> |
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|  | <p>that has kind of helped bring everything in focus.” (P3)</p> <p>Opportunities for practice:<br/> “...especially within the neighborhood that we're placed in. We do have a lot of connections and do get to experience and put that work into play, especially with the pro bono clinic.” (P4)</p> <p>“I think having more volunteer opportunities or opportunities to really be around the community and community events would really help build more knowledge and help us learn a little bit more about the community that we're serving.” (P4)</p> <p>“Especially in the environment that the program is in, it is wildly necessary to address social determinants and using things like the P.R.A.P.A.R.E. tool, exposing students to these concepts in these difficult conversations, as like partial, small exposures within the integrated clinical experiences and then it translates into other coursework in the psychosocial aspects course - having the slight exposure, and then more time to really dive into those larger discussions within an entire course series, I think, was really valuable.” (P5)</p> <p>“...having exposure within the most immediate setting, to start understanding it early and then getting the chance to expand that understanding to multiple settings.” (P5)</p> <p>Fostering empathy: “Taking ourselves out of the clinic, and putting ourselves into the space of someone trying to</p> |
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|  | <p>access these things and navigate these social determinants, navigate these barriers, I think really prepared me for identifying a person's barriers and helping to navigate the resources and the health care system and advocate for those individuals.” (P5)</p> <p>“We need to keep [SDOH] as a very largely integrated part of the curriculum and the discussion, and to continue to challenge the students for difficult conversations, difficult ethical dilemmas. And to challenge us to get into those settings and utilize those resources, provide resources. And I think, even discuss some of those things more within our clinical courses where it's a part of, like, our skills practice, part of our psychosocial aspect of conducting our social interviews, part of addressing our education. I think, within the classroom more practice of doing that will better prepare all students.” (P5)</p> <p>“Even just having some other students talk about different things - has really like, opened my eyes to things that I was like, Ohh! I didn't realize that like this happens. This is a problem. This is an issue. Because I haven't experienced it and I haven't seen it so - or maybe I have seen it and I just don't know.” (P6)</p> <p>“It's been really helpful to see the people in these different areas, because the places that I worked in outpatient prior to coming to school, were more white, affluent areas. And being in the city and seeing the barriers to entry for care or home life or just like access has</p> |
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|  |  | <p>been really interesting and important.” (P7)</p> <p>“I feel like we started the conversation in Teaching and Learning last summer, and just about being able to work as a team and always being very patient-focused, as a whole, like it's not just their impairment. You're treating a person, and [faculty] continue to emphasize that being in this community, it's a big issue that we're constantly trying to balance all these different social determinants of health that the community is facing. So I feel like in every class, like, they mentioned that it's treating the whole person, and that's regardless of where you are too, but it's definitely more prevalent in this area. (P8)</p> <p>“[The curriculum] is definitely making me more empathetic because it's hard to understand it unless you went through it yourself, which I haven't personally. But the more I'm being exposed to it, the more I feel like I can understand it and be able to provide the appropriate response for those patients.” (P8)</p> <p>Integrated clinical experience: “That was a really intimidating conversation because what if they say they don't have the home and this is the first time we're figuring it out, and I freeze because I'm like, you know, that's something I really can't comprehend from my own life and it makes me very upset. So being able to hold a straight face when someone says that to you is a lot for me. So being able to have that conversation because it's something we have to figure out about a patient -</p> |
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|  | <p>that's definitely an experience that was very helpful.” (P10)</p> <p>“Here unfortunately, like, I'm scared sometimes because I feel like everyone could potentially have [a gun]. So here there is even more danger in comparison to living abroad. So it's something that you need to keep in mind, especially if you are working with underserved people who may have encountered like something bad in their life.” (P11)</p> <p>“I think the other day, in CEIS, we were talking about being able to help people who have disabilities and have to use assistive devices. And just like their... that's their freedom. And being able to help them through that - I think was a big eye opener. So I never really thought of it that way. I was like oh, we're just kind of here to help them, and you know they need assistive devices or wheelchairs and anything like that. And I didn't look at it from, you know, that's their freedom. That's how they get around. This is their life.” (P12)</p> <p>“I also found it helpful to be like in a situation like [community clinic] or pro bono and experience [difficult conversations] and then have someone be able to give feedback or have someone to bounce off of while you're getting comfortable with it. Whereas, like, if I'm saying something, and you know there is something else that needs to be said like there's either another student or professor there to continue to get comfortable with it because the whole point... it's uncomfortable conversations, right? There are things</p> |
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|  | <p>that are challenging. So I think having those opportunities to challenge yourself to do it are important.” (P13)</p> <p>“...it could be introduced earlier, especially when we're getting into the clinic, cause you're gonna have those conversations, and you're already stressed about talking to a patient in general. So I just feel like because of how we are immersed in a community where it's very prevalent, making any way for students to feel more comfortable with those conversations would be beneficial. Like just more within the curriculum.” (P13)</p> <p>“I think the most useful thing is putting it into practice... it's hard. And so you have to do it to know you can.” (P13)</p> <p>“I often go back to our zoom calls that we have with other students from different departments. I kind of wish that that would then translate into like real life.” (P14)</p> <p>“We only use scenario-based things and, again nothing wrong with that per se, it's just that when it really comes down to the real life situations that come into play, it's “and then what?” You know, how do we kind of carry that forward from our IP experiences?” (P14)</p> <p>ICE: “one of the biggest parts of the program that I feel like really exposed me to the different types of social determinants of health were the part-time clinical experiences.” (P14)</p> <p>Institutional geography: “And given the dynamic, the North Philadelphia</p> |
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|  |  | <p>community and all that's at stake here, like with gun violence, and just lower socioeconomic status amongst minority groups in the communities, and the opioid crisis, and all these other things that just kind of like hit the North Philadelphia community all at once. I saw it first hand.” (P14)</p> <p>“The psychosocial aspects course - learning how to make sure that these implicit biases don't get in the way of how we treat an individual’s plan of care. So it definitely did make me aware of, you know, why am I thinking about giving this plan of care to this individual? Is it because they're classified as an elderly individual, and I want to be overly cautious? Or is it because I think that they're incapable of doing this?” (P14)</p> <p>“I would say overall I think our program did a really, really good job at making social determinants of health kind of like a thing to talk about, and for students to not be afraid to talk about it.” (P14)</p> <p>“Now that I have that experience and continue to have that experience, I have an increased drive to want to go out into the communities and really promote the things that I've learned in school and to better the physical health and the mental health of those members of the community.” (P14)</p> |
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**APPENDIX E**

**ANOVA TABLES FOR SURVEY SAMPLE BELIEFS AND BEHAVIORS**

| Table E1   |   |        |      |        |      |      |      |                  |      |
|--|---|--------|------|--------|------|------|------|------------------|------|
| ANOVA for Attitudes and Differences by Cohort, Gender, Race, and First-Generation Status |   |        |      |        |      |      |      |                  |      |
| Sample Beliefs   |   | Cohort |      | Gender |      | Race |      | First Generation |      |
|  |   | F      | p    | F      | p    | F    | p    | F                | p    |
| 17.1   | Physical therapy services should be available to all members of the community, regardless of an individual's financial resources or insurance status. | 0.69   | 0.50 | 0.20   | 0.90 | 0.17 | 0.68 | 0.88             | 0.35 |
| 17.2   | Physical therapy services should be available to all members of the community, regardless of an individual's citizenship or immigration status.       | 1.49   | 0.23 | 0.09   | 0.96 | 2.14 | 0.15 | 0.88             | 0.35 |
| 17.3   | Access to resources to maintain health and wellness should be a priority for federal funding programs.  | 0.18   | 0.83 | 2.25   | 0.09 | 0.00 | 0.95 | 4.16             | 0.05 |
| 17.4   | Physical therapists have a professional responsibility to provide pro bono services to  | 0.18   | 0.83 | 0.28   | 0.84 | 0.00 | 0.96 | 1.08             | 0.30 |

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|      | individuals and communities that are underserved by the health care system.   |      |      |      |      |      |      |      |      |
| 17.5 | Physical therapists have a responsibility to engage in community health efforts.  | 0.66 | 0.52 | 0.83 | 0.48 | 0.91 | 0.34 | 1.94 | 0.17 |
| 17.6 | Physical therapists should advocate for community-based education about healthy behaviors (e.g., smoking cessation, alcohol moderation, sleep hygiene, stress reduction). | 1.41 | 0.25 | 0.15 | 0.93 | 0.89 | 0.35 | 2.47 | 0.12 |
| 17.7 | During my DPT education, I have a personal responsibility to provide pro bono services to individuals and communities that are underserved by the health care system.     | 0.60 | 0.55 | 1.82 | 0.15 | 0.03 | 0.88 | 1.45 | 0.23 |
| 17.8 | Within my DPT education, I am interested in volunteering in pro bono clinical and community programs that   | 0.67 | 0.51 | 1.12 | 0.35 | 1.04 | 0.31 | 0.98 | 0.33 |

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|       | provide physical therapy services to underserved communities.   |      |      |      |      |      |      |      |      |
| 17.9  | I am vested in the needs of others.   | 0.06 | 0.94 | 2.73 | 0.05 | 0.04 | 0.84 | 6.37 | 0.01 |
| 17.10 | I respect the values of others, even if they are different from my own.   | 1.95 | 0.15 | 1.48 | 0.23 | 0.00 | 0.99 | 1.14 | 0.29 |
| 17.11 | I acknowledge my own potential biases, including but not limited to, biases about body size, ability levels, educational levels, gender identity, race and ethnicity, and religion. | 3.41 | 0.04 | 0.80 | 0.50 | 0.47 | 0.50 | 0.34 | 0.85 |
| 17.12 | Mutual trust between a physical therapist and the individual or community receiving services is essential for societal health and wellness.   | 0.27 | 0.77 | 0.17 | 0.92 | 0.06 | 0.81 | 2.55 | 0.11 |

| Table E2   |  |        |      |        |      |      |      |                  |      |
|--|--|--------|------|--------|------|------|------|------------------|------|
| ANOVA for Perceived Knowledge and Differences by Cohort, Gender, Race, and First-Generation Status |  |        |      |        |      |      |      |                  |      |
| Sample Behaviors   |  | Cohort |      | Gender |      | Race |      | First Generation |      |
|  |  | F      | p    | F      | p    | F    | p    | F                | p    |
| 18.1   | I recognize potential barriers to an individual's health, including but not limited to, societal, structural, community, and individual barriers.  | 0.23   | 0.80 | 0.02   | 1.00 | 0.58 | 0.45 | 0.04             | 0.83 |
| 18.2   | I recognize risk factors for chronic disease and understand how these factors impact an individual's function, participation, and quality of life. | 1.86   | 0.16 | 1.32   | 0.27 | 0.56 | 0.46 | 0.97             | 0.33 |
| 18.3   | I understand the constructs of behavior change theories (e.g., Social Cognitive Theory or the Transtheoretical Model) and how these can be         | 1.20   | 0.31 | 0.62   | 0.60 | 0.04 | 0.85 | 2.45             | 0.12 |

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|      | applied to evidence-based education and interventions for individuals and caregivers.  |      |      |      |      |      |      |      |      |
| 18.4 | I understand the concept of population health and my role (as a physical therapy student) in addressing health and wellness, disease prevention, and health promotion. | 1.10 | 0.34 | 1.18 | 0.32 | 0.12 | 0.73 | 0.01 | 0.92 |
| 18.5 | I understand social and structural determinants of health and their impact on the health and wellness of individuals and communities.                                  | 1.64 | 0.20 | 1.33 | 0.27 | 0.05 | 0.82 | 0.33 | 0.57 |
| 18.6 | I am able to identify health indicators (e.g., physical activity, educational level,   | 1.93 | 0.15 | 0.81 | 0.49 | 1.36 | 0.25 | 0.00 | 0.97 |

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|      | socioeconomic status, and the built environment/neighborhood) and understand their role in monitoring population health.                       |      |      |      |      |      |      |      |      |
| 18.7 | I know how to access population health data (e.g., CDC) to inform plans for disease prevention and health promotion.                           | 0.90 | 0.41 | 0.55 | 0.65 | 4.83 | 0.03 | 2.33 | 0.13 |
| 18.8 | I recognize clients' potential need for services outside of my own scope of practice, specifically mental health services and social services. | 0.37 | 0.69 | 0.70 | 0.56 | 5.64 | 0.02 | 0.28 | 0.60 |

| Table E3  |  |        |       |        |      |      |      |                  |      |
|---|--|--------|-------|--------|------|------|------|------------------|------|
| ANOVA for Perceived Skills and Differences by Cohort, Gender, Race, and First-Generation Status |  |        |       |        |      |      |      |                  |      |
| Sample Behaviors  |  | Cohort |       | Gender |      | Race |      | First Generation |      |
|   |  | F      | p     | F      | p    | F    | p    | F                | p    |
| 19.1  | I consistently implement evidence-based health promotion with all clients and communities.   | 8.82   | <.001 | 0.48   | 0.70 | 0.25 | 0.62 | 0.59             | 0.44 |
| 19.2  | I consistently provide screening in community or clinical settings using evidence-based health promotion and prevention resources.                             | 14.17  | <.001 | 0.40   | 0.76 | 0.06 | 0.82 | 0.06             | 0.82 |
| 19.3  | I am an informed member of the interprofessional health care team that effectively addresses and reduces disease risk factors for individuals and communities. | 9.93   | <.001 | 0.56   | 0.65 | 0.03 | 0.87 | 1.68             | 0.20 |
| 19.4  | I consistently educate individuals and communities about   | 2.72   | 0.07  | 0.45   | 0.72 | 0.97 | 0.33 | 0.97             | 0.33 |

|      |   |       |       |      |      |      |      |      |      |
|------|---|-------|-------|------|------|------|------|------|------|
|      | evidence-based nutritional recommendations to promote healthy eating.   |       |       |      |      |      |      |      |      |
| 19.5 | I consistently educate individuals and communities about the value of movement and exercise to improve health and reduce disease risk.  | 10.00 | <.001 | 1.21 | 0.31 | 0.22 | 0.64 | 0.00 | 0.99 |
| 19.6 | I consistently utilize community resources to promote healthy behaviors (e.g., physical activity, stress reduction/management, sleep hygiene, smoking cessation) for individuals and communities. | 5.05  | 0.01  | 0.60 | 0.62 | 0.00 | 0.96 | 0.71 | 0.40 |
| 19.7 | I consistently provide information regarding health promotion, wellness, and healthy behaviors  | 5.80  | 0.00  | 0.44 | 0.72 | 0.47 | 0.49 | 0.00 | 0.97 |

|      |  |       |       |      |      |      |      |      |      |
|------|--|-------|-------|------|------|------|------|------|------|
|      | while respecting an individual's needs regarding their personal values, beliefs, and communication needs.  |       |       |      |      |      |      |      |      |
| 19.8 | I consistently assess individuals' and communities' health assets, risks, and goals, including assessment of environmental factors on health and wellness. | 14.82 | <.001 | 1.25 | 0.30 | 0.03 | 0.87 | 2.89 | 0.09 |
| 19.9 | I consistently adapt evidence-based interventions based on individual assets, risks, and goals to optimally meet individual and community needs.           | 17.62 | <.001 | 0.81 | 0.49 | 0.14 | 0.71 | 1.60 | 0.21 |

|       |   |       |       |      |      |      |      |      |      |
|-------|---|-------|-------|------|------|------|------|------|------|
| 19.10 | When developing and implementing health promotion interventions, I consistently acknowledge and respond to health disparities experienced by marginalized and underserved communities (e.g., communities of color, socioeconomic disadvantage, or disparities related to gender, gender identity or disability status). | 10.36 | <.001 | 1.03 | 0.38 | 0.08 | 0.78 | 1.35 | 0.25 |
| 19.11 | I consistently incorporate knowledge of social and structural determinants of health into interventions to address disease prevention and health promotion.   | 10.80 | <.001 | 0.87 | 0.46 | 0.00 | 0.97 | 2.08 | 0.15 |

|       |   |      |      |      |      |      |      |      |      |
|-------|---|------|------|------|------|------|------|------|------|
| 19.12 | I consistently incorporate stress-management strategies as a component of health promotion for individuals and communities. | 4.68 | 0.01 | 1.11 | 0.35 | 0.18 | 0.68 | 3.39 | 0.07 |
| 19.13 | I consistently refer clients to appropriate resources for mental health and social services, as needed.                     | 4.23 | 0.02 | 0.34 | 0.79 | 0.84 | 0.36 | 0.84 | 0.36 |
| 19.14 | I consistently communicate and follow up with members of the interprofessional team to close the loop on clients' concerns. | 4.28 | 0.02 | 0.23 | 0.88 | 0.57 | 0.45 | 1.14 | 0.29 |