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Self-Efficacy Of Applied Doctoral Students Scale: Initial Development And Validation

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SELF-EFFICACY OF APPLIED DOCTORAL STUDENTS SCALE: INITIAL DEVELOPMENT AND VALIDATION

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Table of Contents

List of Figures

List of Tables

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Abstract

The present study explored the development and initial validation of a measure of doctoral student self-efficacy for students in Health Profession Training (HPT) programs. There is a gap in existing scales that measure the full spectrum of tasks that contribute to doctoral self-efficacy. The scales that do exist focus on broad self-efficacy (Chen et al., 2001) or program specific self-efficacy in one area (Stump et al., 2012; Van Horn & Christman, 2017; Lent et al., 2003).

Our purpose was to develop and provide initial norming and validity information for the Self-Efficacy of Applied Doctoral Students (SEADS) Scale. The SEADS was developed following Bandura's Social Cognitive Theory (SCT, Bandura, 1991), William's (2005) article that defines three areas of doctoral self-efficacy (academics, research, and social), and our addition of clinical and DEI factors). The SEADS assesses HPT doctoral student self-efficacy across six domains of graduate school: research skills, clinical skills, peer relationships, advisor relationships, clinical supervisor relationships, and diversity, equity, and inclusion (DEI).

From the exploratory analyses of the SEADS, an orthogonal six-factor structure emerged, which accounted for 56% of the total variance. This factor structure was representative of the six domains of HPT doctoral student self-efficacy (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy). Cronbach's alpha levels ranged from .916 to .966. Overall, the corresponding factors of the SEADS demonstrated moderate to strong convergent validity with the New General Self-Efficacy Scale (Chen et al., 2001), the Self-

Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Bandura, 1989; Bandura, 2006), a brief version of the Self-Efficacy in Research Measure (Phillips & Russell, 1994; Kahn & Scott, 1997), the Physical Therapist Self-Efficacy scale (Venskus & Craig 2017), and the Openness to Diversity Scale (Pascarella et al., 1996).The SEADS also demonstrated appropriate divergent validity with the Social Desirability Scale-17 (Stöber, 2001).

Limitations of the SEADS include the length of the measure, positive skew of the data, and the majority of participants identifying as White, heterosexual, cisgender women and enrolled in doctoral programs in psychology, physical therapy, and occupational therapy. When further norming is completed, the SEADS will be a useful tool for measuring and intervening within specific domains of HPT doctoral student self-efficacy.

Self-Efficacy of Applied Doctoral Students Scale: Initial Development and Validation

The most recent data from the Analysis of Baseline Program Data from the Ph.D. Completion Project shows that nationally around 57% of resident doctoral students complete their degree after ten years (Council of Graduate Schools, 2008; Sowell et al., 2015) and attrition rates are similar for online doctoral programs (Terrell et al., 2012). This high rate of attrition is a cause for concern, as it creates lost finances, loss of scientific endeavor and leadership, potential loss of accreditation, and loss of time and effort on behalf of the faculty and students (Di Pierro, 2012). For doctoral students in applied programs, attrition concerns are coupled with the requirement to master many roles during the pursuit of their degree, including academic, student, researcher, clinician, advisee, peer, and supervisee (this is in addition to any personal roles outside of academics). Regardless of the type of Ph.D., research has shown that there is very little difference in academic/classroom success between those who complete their Ph.D. program and those who leave (Lovitts, 2001). Adams (1993) purports that many students leave due to lack of financial support (Ampaw & Jaeger, 2011), inadequate mentorship (Storms et al., 2011), social isolation (Jairam & Kahl, 2012), poor research guidance, and difficult departmental relations.

From a more strengths-based perspective, Adams (1993) list of reasons why Ph.D. students leave their program points also to why people stay. For example, factors leading to success include quality advisor and faculty relationships (Storms et al., 2011) and the cohort model (Lake et al., 2018). Another factor that greatly impacts doctoral student success is self-efficacy. When students believe in their abilities to succeed in graduate school, they are more likely to persist at difficult academic tasks (Linnenbrink & Pintrich, 2002), make more progress

on dissertation work (Faghihi et al., 1999), and complete their degrees in a timely manner (Wao & Onwuegbuzie, 2011).

Self-efficacy has been further broken down into academic, research, clinical, and social self-efficacy. These self-efficacy constructs impact academic outcomes (Hsieh et al., 2007; Pintrich & DeGroot, 1990), research productivity (Phillips et al., 1994), clinical functioning (Lent et al., 2003; Larson & Daniels, 1998), cohort/peer relationships (Jairam & Kahl, 2012), and faculty member relationships (Gardner & Barnes, 2007). Doctoral students who believe in their abilities to succeed in the above roles are less likely to experience burnout and emotional exhaustion (Rigg et al. 2013), high stress levels (Schmitz, 2000), and to persist in the face of difficulty (Linnenbrink & Pintrich, 2002), all of which are factors leading to drop out rates (Ramist, 1981). The goal of our research project was to create a measure of a doctoral student self-efficacy for graduate students in applied fields evaluating self-efficacy in academic skills research skills, clinical skills, relationships with advisors, supervisors, and cohort/peers, and issues of diversity, equity, and inclusion.

Self-Efficacy

The concept of self-efficacy was first defined by Albert Bandura (1977) as how well an individual can perform courses of action required to deal with expected situations. Bandura contends that behavior is highly influenced by self-efficacy, as individuals will avoid an action if they doubt they have the capabilities to succeed (Bandura, 1997). This was further refined as *perceived* self-efficacy, which Bandura (1997) defines as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (p. 2). Self-efficacy beliefs are hypothesized to influence task choice, effort,

persistence, resilience, and achievement through cognitive, motivational, affective, and selection processes (Bandura, 1994; Bandura 1997).

Since Bandura's early work on the idea of self-efficacy, the notion of self-efficacy as a psychological construct has evolved substantially. For example, Zimmerman (1995) adds that self-efficacy is a belief about what someone can do, not based on judgments about personality traits or attributes. Additionally, self-efficacy beliefs are now hypothesized to be domain, context, and task specific (Zimmerman & Cleary, 2006), and levels of self-efficacy can vary across tasks within the same domain (Bandura, 1997). For example, a graduate student may have high self-efficacy at writing papers, but low self-efficacy at giving presentations.

Within an academic context, Zimmerman & Cleary (2006) argue levels of self-efficacy are dependent on mastery performances of the individual, not how they compare to their peers. Mastery performances refer to the experiences an individual gains when taking on a new challenge and succeeding (Bandura, 1997). Those with strong self-efficacy are more likely to approach difficult tasks, have intrinsic motivation, set challenging goals and stick to them, sustain efforts in the face of failure, and recover more quickly from a failure or setback (Bandura, 1994). This outlook facilitates personal accomplishments, which further reinforces strong self-efficacy (Bandura, 1994).

Bandura (1994) explains that individuals establish beliefs of self-efficacy by evaluating four sources: performance accomplishments, vicarious experiences, social/verbal persuasion, and emotional and physiological states. The most influential of these four sources is performance accomplishments, which include personal mastery experiences (Bandura, 1994). Performance accomplishments are repeated success experiences that serve to establish strong self-efficacy beliefs, that serve to buffer against failures, and to strengthen persistence—even in other

situations (Bandura, 1994). Vicarious experiences are learning that occurs by observing others tackling threatening activities without negative consequences, which in turn can help the individual generate expectations that they can achieve similar performance with persistence and work (Bandura, 1994). As this is not direct evidence of one's achievements, it is less influential than performance accomplishments (Bandura, 1994). Social/verbal persuasion is when an individual hears from others that they have the capabilities to master the activities at hand (Bandura, 1994). This works to strengthen self-efficacy as individuals are more likely to put in and sustain greater effort in the face of a challenge (Bandura, 1994). However, this is easily overcome by self-doubt (Bandura, 1994). The intensity of emotional and physiological states and how individuals interpret them can influence self-efficacy (Bandura, 1994). Those with higher self-efficacy will interpret their reactions as an energizing facilitator of performance (Bandura, 1997). While Bandura provides specific descriptions of self-efficacy, self-efficacy is often confounded with self-esteem, self-liking, self-concept, outcome expectations, effectance motivation, and perceived control.

Self-efficacy differs from self-esteem in that self-efficacy is concerned with personal capabilities, and self-esteem focuses on judgments of self-worth (Bandura, 1997). Self-liking does not necessarily bring about performance attainments or affect personal goals (Bandura, 1997). Self-concept differs in that it includes the feelings of self-worth that come with competence beliefs instead of the evaluation of ability (Schunk & Parjares, 2002). Outcome expectations, which are the consequences expected with one's actions, go hand in hand with self-efficacy (Schunk & Parjares, 2002). However, one can have an outcome expectation of failure despite capabilities to succeed (Schunk & Parjares, 2002). It is also different from effectance motivation, which is the motivation to interact effectively with one's environment (White, 1959).

While this includes the perceived capabilities to control one's environment, this construct is global and lacks specificity that self-efficacy encompasses (Schunk & Pajares, 2002). A final construct, perceived control, which is the belief that one can control their performance, is only a part of self-efficacy (Bandura, 1997). Having perceived control does not mean one has strong self-efficacy.

Since its conception by Bandura, many different measures of self-efficacy have been created following Social Cognitive Theory and Bandura's recommendations for scale development. There are several general self-efficacy scales, including the Self-Efficacy Survey (Panc, Mihalcea, & Panc, 2012), which is based on Bandura's Social Cognitive Theory. There are also the New General Self-Efficacy Scale by Chen, Gully, and Eden (2001), the Strengths Self-Efficacy Scale (SSES) by Tsai and colleagues (2014), and the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). While these generally measure an adult's belief in their ability to complete tasks, none of them are specific to doctoral students, nor do they measure self-efficacy about specific graduate school tasks (i.e., research, clinical skills, advisor relationships).

Social Cognitive Theory

The construct of self-efficacy is housed within Bandura's larger Social Cognitive Theory (SCT). SCT explains that learning occurs in a social context with reciprocal interactions between person, environment, and behavior (Bandura, 1991). The overarching goal of the theory is to explain how individuals maintain their behavior through reinforcement to achieve goal directed behaviors over long periods of time (Bandura, 1991). Behavior is maintained through five basic human capabilities of symbolizing, forethought, vicarious learning, self-regulation, and self-reflection (Bandura, 1991). In other words, humans are able to adapt to new environments, think through consequences of actions and set goals, acquire knowledge of behavior through

observation, self-initiate behaviors and goals, and analyze their experiences (Stajkovic & Luthans, 2001). There are six constructs, including reciprocal determinism, behavioral capability, observational learning, reinforcements, expectations, and self-efficacy (Stajkovic & Luthans, 2001). Self-efficacy is the construct that allows individuals to gather and evaluate information about their capabilities, which in turn helps determine if an individual will initiate behaviors, how much effort they will expend, and how long they will sustain it (Stajkovic & Luthans, 2001).

Self-Efficacy and Higher Education

Graduate students in applied professional programs face stress related to coursework, research, clinical training, program demands, imposter syndrome, time constraints, competitive peer environment, difficult faculty relationships, and financial strain (Badali & Habra, 2003; Nelson et al., 2001). The 2006 Graduate Student Mental Health: Needs Assessment and Utilization of Counseling Services Report reports that almost half of graduate student participants have increased emotional and stress related mental health needs that are significantly negatively related to financial strain, relationship with advisor, and lack of social contact (Hyun et al., 2006). Additionally, low self-efficacy is correlated to symptoms of poor psychological functioning in university students, including depression and anxiety (Lavasani et al., 2011). All this stress can increase levels of burnout and emotional exhaustion, which may lead to an increase in absenteeism, lower motivation to engage in academic work, and dropping out (Ramist, 1981). Self-efficacy can act as a buffer against this stress and burnout (Schmitz, 2000). Rigg et al. (2013) found that graduate students who are engaged in studies and have higher self-efficacy are less likely to be emotionally exhausted from their studies.

Previous research looks at how self-efficacy affects specific degree outcomes for graduate students. For example, positive correlation is shown between self-efficacy and role ambiguity for psychology practicum students (Baylor, 2019). More generally, self-efficacy and mastery goals are positively related to academic standing (Bartimote-Aufflick et al., 2016), achievement (Hsieh et al., 2007), and performances on final year grades, classroom work, exams, and essays (Pintrich & DeGroot, 1990). Students with higher self-efficacy are also more likely to value effort, persist in the face of difficulty, and engage in academic tasks (Linnenbrink & Pintrich, 2002).

Williams (2005) proposes three domains making up graduate student self-efficacy: academic, research, and social self-efficacy. Academic self-efficacy refers to a student's belief in their ability to successfully execute course-based activities and assignments; it is grounded in one's belief about performance ability in an academic environment (Jackson, 2002; Bandura, 1997; Linnenbrink & Pintrich, 2002). Research self-efficacy refers to "the degree to which an individual believes they have the ability to complete various research tasks (e.g., conceptualization, analysis, writing)" (Bieschke et al., 1996, p.60). Social self-efficacy in reference to graduate students is a student's belief in their ability to build meaningful, productive relationships with faculty, advisors, and peers within the graduate program environment (Williams, 2005). While these three domains encompass several roles graduate students hold, there appears to be domains missing. For example, some researchers show clinical self-efficacy in health professions programs (i.e., psychology, nursing, physical therapy) to be a critical component of overall graduate student self-efficacy (Lent et al., 2003; Baylor, 2019; Van Horn & Christman, 2017; Wolden et al., 2019). Additionally, it is important to understand if graduate students have self-efficacy towards navigating factors of diversity, equity, and inclusion (DEI)

within their programs, as these factors can impact socialization, satisfaction levels, and commitment to degree completion (Ellis, 2001). For the purposes of this study, students currently enrolled in doctoral programs with a clinical component, including psychology, nursing, physical therapy, occupational therapy, social work, and dietetics will be referred to as Health Professions Trainees (HPT).

Graduate Skills Self-Efficacy

Given the lack of measures to assess the five central components of HPT doctoral programs, the current study purported to develop and provide initial norming evidence for the Self-Efficacy of Applied Doctoral Students (SEADS) Scale. The survey encompassed five domains, including Academic Self-Efficacy; Research Self-Efficacy; Clinical Self-Efficacy; Relational Self-Efficacy; and Diversity, Equity, and Inclusion (DEI) Self-Efficacy. Each of these areas of self-efficacy is reviewed next.

Academic Self-Efficacy. Academics and classroom work are a large part of the doctoral degree, especially in the beginning years. Academic self-efficacy is significantly associated with student learning, cognitive engagement, analytical thinking, academic commitment, strategy use, persistence, and academic achievement (Linnenbrink & Pintrich, 2003). As mentioned above, it includes mainly coursework and assignments (Jackson, 2002). Bandura (1993) outlines that students with high academic self-efficacy will view academic problems as challenges to overcome and will set goals to meet these challenges, they are committed to the academic goals they set, and will increase efforts in the case of failure to meet said goals. Academic self-efficacy is directly and indirectly related to academic expectations and performance (Chemers et al., 2001; Ferla et al., 2010). Chemers et al. (2001) reports that academic self-efficacy is strongly related to students' perceptions of their ability to respond to the demands of school; they saw

school as a challenge rather than a threat. This in turn correlates with higher expectations, better academic performance, and reduced experience of stress (Chemers et al., 2001).

Current measures of academic self-efficacy include the Academic Self-Efficacy Scale (Chemers et al., 2001) and College Academic Self-Efficacy Scale (Owen & Robin, 1988). Both these scales are developed and normed on undergraduate college students, which may miss some of the nuances of graduate studies, such as clinical exams and types of presentations. Additionally, these scales only measure academic self-efficacy, which is only one aspect of the graduate experience, and misses out on the full picture of what impacts doctoral student self-efficacy.

Research Self-Efficacy. Research is a critical aspect of completing a doctoral degree, as many doctoral students are required to complete a dissertation and often additional research under an advisor. However, it can be intimidating for beginning doctoral students as they must master conceptualization, statistical analysis, and writing (Bieschke et al., 1996). Researchers show self-efficacy can be built through faculty modeling or research, positive reinforcement, and low-threat involvement in research activities (Gelso, 1993; Kahn & Gelso, 1997). Phillips and Russell (1994) suggests that research self-efficacy can be strengthened by following Bandura's Social Cognitive Theory, through early and active research as mastery performance accomplishments, role modeling of the research process as vicarious learning, and faculty and advisor support as verbal persuasion. This study finds a significant positive relationship between research self-efficacy and perceptions of the training environment as well as research productivity (Phillips & Russell, 1994). It also shows that participants with low self-efficacy will engage in behavioral avoidance, meaning less research productivity (Phillips & Russell, 1994).

A case study evaluates the level of self-efficacy for more specific research skills, including understanding journal articles and the writing process (Gökçek et al., 2014). The researchers report that less than half of graduate students surveyed felt efficacious in benefitting from reading articles, determining a thesis/dissertation topic, writing a dissertation proposal, and analyzing and interpreting either qualitative or quantitative data (Gökçek et al., 2014). However, more than half felt competent in obtaining and reviewing the literature and using databases (Gökçek et al., 2014). Overall, research self-efficacy is a critical component to completing the doctoral degree due to its correlation with overall research productivity (Phillips et al., 1994) and dissertation progress (Faghihi et al., 1999)

Current measures of research self-efficacy include the Nursing Research Self-Efficacy Scale (Swenson-Britt & Berndt, 2013), the Research Self-Efficacy Scale (RSS; Büyüköztür et al., 2011), the Research Self-Efficacy Scale (RSES; Bishop et al., 1993), and the Self-Efficacy in Research Measure (SERM; Phillips & Russell, 1994). The SERM (Phillips & Russell, 1994) will be used for convergent validity, as it is normed on doctoral students in counseling psychology and measures research design, practical skills, computer and writing skills. However, these scales only measure research self-efficacy, which is missing several other aspects of the doctoral experience.

Clinical Self-Efficacy. Doctoral students in HPT programs are often required to participate in a practicum training experience in order to master basic clinical skills (Baylor, 2019). Clinical self-efficacy is the practicum students' belief in their ability to perform skills and behaviors related to their profession (i.e., counseling, physical therapy, nursing) or to negotiate particular clinical situations (Lent et al., 2003; Baylor, 2019). Self-efficacy is critical for improving clinical skills as providers/clinicians who lack self-efficacy in their clinical abilities

may not take the action needed to care for their patients (Johnson & Kurtz, 2001). Additionally, students need to have an accurate self-efficacy, meaning they can accurately determine their capabilities to complete a task (Stump et al., 2012). If a student is overly efficacious, they may attempt a clinical skill independently instead of seeking supervision (Stump et al., 2012).

Research suggests that higher clinical self-efficacy in practicum training students lessens anxiety, has greater positive effects, and allows for more favorable skill usage (Lent et al., 2003; Larson & Daniels, 1998). Other studies show for counselors specifically, self-efficacy affects levels of clinical functioning, such as their behavioral, cognitive, and affective responses while practicing (Larson & Daniels, 1998) and plays a role in career development, including their interest in and goals regarding their clinical work (Heppner et al., 1996). In a study on physical therapy students, practicum experiences increase clinical self-efficacy, which in turn influence ability to effectively communicate with clients, keep clients engaged, and achieve effective patient handling skills (Wolden et al., 2019). Students in the Wolden study also no longer see clinical work as a threat, but as a challenge to overcome (Wolden et al., 2019). Among nurses, clinical self-efficacy impacts overall nursing clinical performance (Cheraghi et al., 2011) and demonstrates a positive correlation with fieldwork performance for healthcare students (Opacic, 2003).

In fact, there are very few scales that measure general clinical skill self-efficacy that are not for specific doctoral programs, such as nursing, counseling, and physical therapy. The Learning Self-Efficacy Scale (Kang et al., 2019) is normed on medical students in Taiwan and measures self-efficacy of learning broad clinical skills in areas of cognition, emotion, and psychomotor skills. The Counseling Skills Self-Efficacy Scale (Melchert et al., 1996) more specifically assesses counselor trainee self-efficacy in group and individual counseling skills.

Neither of these scales or the others available measure the broad self-efficacy of clinical skills for doctoral students. Additionally, since these scales only measure clinical self-efficacy, they leave out several aspects of the doctoral student experience.

Relationship Self-Efficacy

Doctoral students must navigate relationships with their peers/cohort, their main faculty advisor(s), and clinical supervisor(s) or preceptor(s). Studies show that doctoral students who report more social support report less stress, health problems and emotional problems (Goplerud, 1980; Mallinckrodt and Leong, 1992). Along with this, students who receive support through regular interactions with their advisor complete their degrees more quickly (Wao & Onwuegbuzie, 2011). Knowing what previous research has shown, a doctoral student's ability to build and maintain these relationships during their degree is critical to academic outcome and overall well-being.

Peers/Cohort Relationships. Obtaining a doctoral degree is stressful, with the academic rigor, timelines, and internal and external environments that can exacerbate that stress (Offstein et al., 2004). Often when coming to graduate school, a student's social support changes, meaning they cannot rely on outside friends and family for stress relief, which can in turn lead to burnout or dropping out of the program (Johnson et al., 2008). Doctoral attrition rates are linked to two factors, stress (Lovitts, 2001) and social isolation (Ali & Kohun, 2007), which are very common when entering a new graduate program (Lovitts, 2001; Ali & Kohun, 2007). Additional research indicates a negative relationship between social support and stress, and that female doctoral students experience less support and higher stress levels than male doctoral students (Hodgson & Simoni, 1995). Goplerud (1980) reports that students with social support have fewer health problems, emotional problems, and less stress.

A study by Jairam and Kahl (2012) finds that cohort/peers provide emotional and professional support by providing empathy, encouragement, and enjoyment (Jairam & Kahl, 2012). The participants express that cohort/peers allow them to vent about academic struggles, put things in perspective, cheer them on through difficult moments, and have interaction and support outside school settings (Jairam & Kahl, 2012). Cohort/peers are a valuable professional support by providing time management advice, assistance with research and writing, and providing inspiration to each other (Jairam & Kahl, 2012). On the other hand, competition among cohort/peers heightens anxiety, which negatively impacts academic performance, hindering degree completion (Jairam & Kahl, 2012).

Advisor Relationship. Most doctoral students work under one main faculty advisor that serves as an anchor point to the program. Researchers continuously show that the advisor/advisee relationship is one of the most important relationships in graduate school (Baird, 1995; Barnes, 2009). Advisor expectations, values, and roles can vary based on the program and individual (Barnes, 2009), however Paglis and colleagues (2006) define the advisor relationship as having three main roles: psychosocial mentoring, career-related mentoring, and research collaboration. Feeling efficacious in their ability to navigate advisor relationships can help mediate doctoral student attrition rates and time to degree completion (Gardner & Barnes, 2007).

There is a dearth of research on the impact of healthy advisor-advisee relationships. For instance, Heath (2002) finds that students who meet more often with their faculty advisors are more likely to finish their degree. Others find that the advisor working alliance is positively and indirectly associated with research self-efficacy through relation-inferred self-efficacy (Cobb et al., 2020). A strong advisory alliance can help students believe in their research abilities and learn that others have confidence in them (verbal persuasion) (Cobb et al., 2020). Along these

lines, the psychosocial mentoring mentioned above is shown to positively influence students' self-efficacy (Paglis et al., 2006). Additionally, constructive advisor relationships also positively affect sense of belonging and ability to fit in, as well as stronger academic self-concept (Curtin et al., 2013), which contribute to lower dropout rates. Because this relationship is so critical to the success of doctoral students, these students need to feel efficacious in accomplishing tasks the advisor gives as well as asserting their needs to said advisor.

Clinical Supervisor Relationship. Doctoral students in applied programs are often required to participate in training experiences in order to master basic skills in their field (Baylor, 2019). Supervision is defined as an intervention provided by a senior member of the profession to a junior member of the profession with the purpose of enhancing professional functioning of the junior member (Bernard & Goodyear, 2013). The format and guidelines for supervision will look different based on the field, program, and individual. However, many clinical supervisors in psychology utilize Bernard and Goodyear's model of supervision, where the supervisor takes on the role of consultant, teacher, and counselor (2009). The supervisory working alliance is one of the most important factors contributing to change and growth during the process of supervision (Bordin, 1983), and is based on mutual goals and tasks, rapport, and trust (Crockett & Hayes, 2015). This relationship is shown to reduce vicarious trauma and burnout (Dupre et al., 2014; Bordin, 1983).

When there is a strong working alliance, all four of the sources of self-efficacy should be experienced (Ladany et al., 1999). For example, support and encouragement are forms of verbal persuasion, feedback to improve skills and seeing a better outcome is a mastery performance, and role playing or practicing skills can be vicarious experiences (Ladany et al., 1999). Emotional arousal is seen in counseling because of the nature of therapy (Ladany et al., 1999).

Ladany et al. (1999) finds that as the working alliance becomes stronger, particularly the growth of an emotional bond, trainees experience greater satisfaction.

Several studies show that when supervisees receive clear expectations, constructive feedback, and structural support, they report higher levels of self-efficacy (Nilsson & Duan, 2007; Bernard & Goodyear, 2009). Additionally, the higher a students' self-efficacy, the better they are able to seek and incorporate feedback from clinical supervisors (Nease et al., 1999), which impacts their ability to learn from clinical experiences. On the other hand, when the supervisory alliance is weak, supervisees' experience burnout, stress, decline in skill development, low self-efficacy, and isolation (Bernard & Goodyear, 2004). Due to the importance of this relationship for clinical growth and clinical self-efficacy, doctoral students need to feel efficacious in building the working alliance, completing tasks the supervisor gives, and asking for what they need.

Diversity, Equity, and Inclusion Self-Efficacy

The majority of doctoral programs, specifically those in applied fields, place an emphasis on practices of diversity, equity, and inclusion (DEI). This includes preparing doctoral students to address societal problems and engage with others across differences in social identities, values, and beliefs (Perez et al., 2020). Research shows that stereotypes affect participation and success of individuals from marginalized groups in academia, especially in STEM (Ong et al., 2011). This not only effects how students interact with patients in a clinical setting, but how they interact with peers/cohort, faculty, supervisors and address multicultural considerations in a research setting. Studies report multicultural competency, research training, and multicultural environment (as described below) are related to multicultural research self-efficacy (Liu et al., 2004). The study from Liu et al. (2004) suggests as students develop efficacy around

multicultural issues in practice settings, that efficaciousness extends to conducting multicultural research. There is also the concept of a multicultural environment in graduate school, which can include minority representation, curriculum issues, physical environment, faculty competency (Ponteretto, 1997), and climate and comfort (Pope-Davis et al., 2000).

It is critical to take into account doctoral students' ability to navigate these systems through a multicultural lens as students, as well as individuals with marginalized identities. Research demonstrates that race and gender impact socialization, satisfaction level, and commitment to doctoral degree completion (Ellis, 2001). A qualitative study reports that White women often express disappointment with the lack of community in their departments, and Black women express feeling very little connection with their doctoral communities (Ellis, 2001). Professors' failure to deal openly with issues of race and social standing is a main concern of Black female students (Ellis, 2001). Additionally, White females, and Black males and females express more dissatisfaction with their advisors; Black females also report having more confrontational relationships with their advisors (Ellis, 2001). A study of Black students at Predominantly White Institutions (PWI) demonstrates that navigating feelings of isolation, relationships with peers, and knowledge on how to navigate through higher education are critical to the students' development and success in pursuit of a doctoral degree (Lewis et al., 2004). Having the confidence to navigate these issues is important for marginalized students as higher self-efficacy, positive racial identity attitudes, and higher levels of program integrations are associated with higher cumulative GPA (Reid, 2013).

Purpose

While self-efficacy has been thoroughly studied since the concept was established by Bandura in 1977, it has not been applied and adapted for certain populations. This is important

considering how self-efficacy is believed to vary based on the domain of functioning and context influencing the behaviors (Bandura, 2006). There are several general self-efficacy scales, and academically, there is an Elementary Student Self-Efficacy Scale (Fertman & Primack, 2009) focused on student learning, peer relations, and drug abstinence. There are scales for specific fields/programs, such as the Nursing Student Self-Efficacy Scale (Stump et al., 2012), the Health Student Self-Efficacy Scale (Eachus, 1993), the Clinical Skills Self-Efficacy Scale for nursing students (Van Horn & Christman, 2017), the College Chemistry Self-Efficacy Scale (Uzuntiryaki & Capa Aydin, 2009), and the Counselor Activity Self-Efficacy Scale (Lent et al., 2003).

More specific scales (that may be important for convergent and divergent validity) are the Academic Self-Efficacy Scale (Chemers et al., 2001) and College Academic Self-Efficacy Scale (Owen & Robin, 1988), which are used to help assess the relationship between academic performance and self-efficacy. There are the Nursing Research Self-Efficacy Scale (Swenson-Britt & Berndt, 2013), the Research Self-Efficacy Scale (RSS) (Büyüköztür et al., 2011), and the Research Self-Efficacy Scale (RSES) (Bishop et al., 1993) which evaluate abilities to critically evaluate research, applying theory (Swenson-Britt & Berndt, 2013), choosing appropriate methods, criticizing research results (Büyüköztür et al., 2011), and conceptualization of research (Bishop et al., 1993).

Despite the multitude of self-efficacy scales evaluating academics, specific skills, and for specific majors, there is not a scale that encompasses the breadth of the HPT doctoral student experience. Therefore, the present study aimed to develop and validate a measure of self-efficacy for HPT doctoral students, with the purpose of evaluating self-efficacy across the domains relevant to HPT doctoral students: academic skills; research skills; clinical skills; relationship

skills with advisors, supervisors, and cohort/peers; and skills related to diversity, equity, and inclusion (DEI).

Hypotheses

The SEADS scale was hypothesized to have five orthogonal scales, made up of the five components of doctoral student self-efficacy (academic, research, clinical, relationships, and DEI). It was expected the overall scale would have coefficient alpha's of approximately .80. In terms of convergent and divergent validity, the hypothesis of the current study was that the five individual subscales of the SEADS would have positive moderate correlations with other current self-efficacy measures and weak correlations with a measure of social desirability. More specifically, we hypothesized the following:

Hypothesis 1A. It was hypothesized that the Self-Efficacy of Applied Doctoral Students (SEADS) Scale would measure doctoral student self-efficacy, made up of five orthogonal factors, each reflecting a different domain of HPT doctoral student self-efficacy, including Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy.

Hypothesis 1B. It was alternatively hypothesized that the SEADS would be composed of five factors, Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy, that are all related to one another.

Hypothesis 1C. It was alternatively hypothesized that the SEADS would be composed of two unrelated subscales, Graduate Skills Self-Efficacy (academic skills and research skills) and Applied Relational Self-Efficacy (clinical skills and relationship skills).

Hypothesis two. It was hypothesized that the individual item loadings would be ≥ .40 for items on each factor (Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy) of the SEADS.

Hypothesis three. It was predicted that the SEADS would demonstrate an orthogonal factor structure that accounts for over 50% of the total variance.

Hypothesis four. It was predicted that the five subscales of the SEADS would each demonstrate a strong internal consistency, as evidenced by an alpha coefficient or .80 or higher (DeVellis, 2012).

Hypothesis five. It was predicted that the five subscales of the SEADS would demonstrate strong construct validity, as evidenced by a significant increase in mean self-efficacy over time (e.g., years in the program).

Hypothesis six. It was predicted that there would be a low to moderate convergent validity of the New General Self-Efficacy Scale (Chen et al., 2001) with the five subscales of the SEADS, Academic Self-Efficacy ($r \geq .30$), Research Self-Efficacy ($r \geq .30$), Clinical Self-Efficacy ($r \geq .30$), Relationship Self-efficacy ($r \geq .30$), and DEI Self-Efficacy ($r \geq .30$).

Hypothesis seven. It was predicted that there would be a moderate to strong convergent validity of the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Bandura, 1989; Bandura, 2006) with the SEADS Academic Self-Efficacy subscale ($r \geq .30$).

Hypothesis eight. It was predicted that there would be a moderate to strong convergent validity of the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) with the SEADS Relationship Self-Efficacy subscale ($r \geq .30$).

Hypothesis nine. It was predicted that there would be a moderate to strong convergent validity of the brief version of the Self-Efficacy in Research Measure (Phillips & Russell, 1994; Kahn & Scott, 1997) with the SEADS Research Self-Efficacy subscale ($r \geq .30$).

Hypothesis ten. It was predicted that there would be a moderate to strong convergent validity of the Physical Therapist Self-Efficacy scale (Venskus & Craig 2017) with the SEADS Clinical Self-Efficacy subscale ($r \geq .30$).

Hypothesis eleven. It was predicted that there would be a moderate to strong convergent validity of the Openness to Diversity Scale (Pascarella et al., 1996) with the SEADS DEI Self-Efficacy subscale ($r \geq .30$).

Hypothesis twelve. It was predicted that there would be no significant correlations between any of the subscales on the SEADS ($-.30 < r < .30$).

Hypothesis thirteen. It was predicted that there would be low correlations between the Social Desirability Scale-17 (Stöber, 2001) and all five subscales of the SEADS (Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy) each fall between $-.20 < r < .20$ with the social desirability.

Methodology

The present study explored the initial development and exploratory analyses of a psychometrically sound measure called the Self-Efficacy in Applied Doctoral Students scale (SEADS), which assesses HPT doctoral student self-efficacy in different graduate school domains- academic skills, research skills, clinical skills, relationships, and diversity, equity, and inclusion. The scale is specific in addressing task domains and the behavioral factors over which individuals have control as noted by Bandura (2006).

Study Participants

Respondent Recruitment

With prior approval from the University of North Dakota (UND) Institutional Review Board (IRB) (IRB0003312), the SEADS was broadcast on social media and listservs to participants currently enrolled in doctoral programs in professional and behavioral health fields (e.g., counseling psychology, school psychology, clinical psychology, social work, nursing, nutrition/dietetics, occupational therapy, and physical therapy) in the United States. Participants completed the survey through convenience sampling, upon their willingness.

The survey was conducted through Qualtrics. Informed consent was obtained, and participants had the option to check "Yes, I consent" or "No, I do not consent" to engage in the survey. Following consent, participants were asked if they are currently enrolled in a professional or behavioral health doctoral program. If yes, they were prompted to provide the field and degree program they are currently enrolled in. Following these questions, the SEADS was presented, followed by randomized validity scales, and demographic information questions in a multiple choice and fill-in the blank format. After completion of the survey, participants viewed a debriefing page that provided a thank you for participating, the researchers' contact information, the purpose of the study, expected benefits and potential risks for participation, as well as resources for mental health support.

Demographics

Data was collected from a diverse sample of doctoral students (N = 710); however, after removing participants for incomplete data or inappropriate responses (see cleaning procedures discussed at the end of this methodology section), the final sample size was N = 356 (see Table 1). The participants in the final sample reported being enrolled in doctoral degrees in Clinical

Psychology (30.6%), Counseling Psychology (9.6%), Counseling Education (0.6%), Dietetics/Nutrition (1.7%), Nursing (3.7%), Occupational Therapy (19.1%), Physical Therapy (12.6%), School Psychology (18.3%), and Social Work (0.8%). Eleven participants (3.1%) identified they will earn a Psy.D. but did not specify in which area of psychology.

The participants indicated their ages were 18 to 24 (23.6%), 25 to 34 (44.9%), 35 to 44 (4.8%), 45 to 54 (1.1%), 55 to 64 (0.6%) and 25% did not answer. Participants identified as White (70.9%), Hispanic/Latinx (8.0%), Asian/Pacific Islander (7.6%), Biracial/Multiracial (6.2%), Black/African American (5.0%), Native American/Alaskan Native (1.7%), Middle Eastern (0.6%), and did not answer (12.9%). Participants mostly identified as Cisgender Women (75.3%) followed by Cisgender Men (7.0%), Nonbinary (3.4%), Transgender Men (0.6%), Other/not listed (0.3%), and two participants chose not to disclose their gender identity (0.6%) while 12.9% skipped the question. Participants identified mostly as Heterosexual/straight (61.8%), followed by Bisexual (15.4%), Gay or Lesbian (3.7%), Pansexual (2.5%), Demisexual (0.84%), Asexual (0.8%), Queer (0.56%), and six participants preferred not to disclose their sexual orientation. 12.6% of participants skipped the question.

Sixty-eight participants (19.1%) identified as having a disability, impairment, or chronic illness, and 126 participants (35.4%) reported having significant mental health concerns. Yearly household income varied widely, with 45 participants (12.6%) earning less than $5000, 5.6% earning between $5000 - $9999, 14% earning between $10,000 - $19,999, 11.8% earning $20,000 - $29,999, 7% earning between $30,000 - $39,999, 3.9% earning between $40,000 - $49,999, 6.7% earning between $50,000 - $59,999, 5.6% earning between $60,000 - $74,999, 5.9% earning between $75,000 - $99,999, and 13.8% earning $100,000 or more. Most participants are not first-generation students (71%), however 16.3% of participants are first

generation college students, with their parents earning some college, a high diploma/GED, or completing some high school with no diploma. Only six participants (1.7%) in the sample identified as international students.

Prior to entering their current doctoral program, most participants have earned a bachelor's degree (80.6%), followed by a master's degree (34.8%), an associate degree (8.7%), a technical degree or certificate (3.4%), a professional degree (1.4%), and another doctoral degree (0.3%). Within their current program, 78 participants reported being in their first year (21.9%), second year (15.2%), third year (25.8%), fourth year (14.9%), fifth year (5.6%), sixth year (3.4%), seventh year or more (0.8%) and 12.4% did not answer. There is a similar split between number of credits earned, with 86 participants (24.2%) reporting they have earned 0-29 credits towards their degree, 30-59 credits (17.7%), 60-89 credits (18.5%), 90-119 credits (16%), 120-149 credits (4.2%), 150-179 credits (0.6%) and 180 credits or more (1.1%), while 17.7% did not answer. The majority of participants had a cumulative GPA above 3.80 (63.4%), followed by 3.79 to 3.50 (10.7%), 3.49 to 3.30 (2.2%), 3.29 to 3.00 (1.8%) and below 3.00 (0.3%). 21.6% of participants did not answer the question.

Around half of the participants reported attending a funded doctoral program (47.2%). Out of those who reported their program was funded, 83.4% of participants reported their program is 50% to 100% funded. The majority of participants reported their programs are cohort model (60.4%) followed by mentor model (17.4%) and other (7.6%). The most prominent program task was academic work (74.7%) followed by research (71.1%), clinical practice (65.2%), teaching (19.7%), and supervising (16.9%). Most participants reported a program requirement of completing a solo dissertation (64.3%), followed by presenting a poster at a conference (39.3%), completing a project with empirical data (36.2%), writing a manuscript for

publication (18.3%), completing a group dissertation or scholarly project (14.3%), other (9%), and no requirements (3.1%). 263 participants (73.9%) have zero to nine paper or poster authorships, while 30 (8.4%) have ten to nineteen authorships, 11 participants (3%) have 20 to 29 authorships, two participants (0.6) have 30 to 39 authorships, and one (0.3%) has 40 or more.

Most participants reported a program requirement of completing a full-time internship (67.4%), followed by completing practicums during the semesters (66.6%), supervising other students (16.6%), shadowing (14%), and completing a part-time internship (7.3%). The majority of participants (40.4%) reported averaging zero to ten clinical hours per week, followed by 11 to 20 hours (21.1%), 31 to 40 hours (12.6%), 21 to 30 hours (6.8%), and 41 to 50 hours (2.2%). Most participants reported completing less than 500 total practicum hours (55.6%), while 15.7% have completed between 501 and 1000 hours, 5.1% have completed 1001 to 1500 hours, 4.2% have completed between 1501 to 2000 hours, and 5.6% have completed 2000 hours or more. Participants reported working at one practicum site (27%) followed by three sites (19.7%), two sites (13.8%), four sites (9.6%), five sites (4.8%), six sites (2%) and seven or more sites (1.7%).

A majority of participants do not work a campus job or assistantship (45.2%) or a job unrelated to their field/degree (59%). Most participants have a career goal of doing clinical work (63.8%), followed by academia or teaching (8.4%), research (3.7%), and consulting (1.7%). Thirty participants (8.4%) chose "other" and clarified wanting to do a combination of the above career options.

Table 1

Exploratory Study Sample Demographic Information

Demographic Category	Participant Demographic Data	
	N	%
Field/Degree		
Clinical Psychology	109	30.6

Demographic Category	Participant Demographic Data	
	N	%
Counseling Psychology	34	9.6
Counselor Education	2	0.6
Dietetics/Nutrition	6	1.7
Nursing	13	3.7
Occupational Therapy	68	19.1
Physical Therapy	45	12.6
PsyD	11	3.1
School Psychology	65	18.3
Social Work	3	0.8
Total	356	100
Age		
18-24	84	23.6
25-34	160	44.9
35-44	17	4.8
45-54	4	1.1
55-64	2	0.6
Did not answer	89	25.0
Total	356	100
Gender Identity		
Cisgender woman	268	75.3
Cisgender man	25	7.0
Nonbinary	12	3.4
Transgender male	2	0.6
Not listed	1	0.3
Prefer not to answer	2	0.6
Did not answer	46	12.9
Total	356	100
Race (can select more than one)		
Asian/Pacific Islander	27	7.6
Black/African American	18	5.0
Hispanic/Latinx	29	8.0
Middle Eastern	2	0.6
Native American/Alaskan Native	6	1.7
White	253	70.9
Biracial/Multiracial	22	6.2
Did not answer	46	12.9
Sexual Orientation		
Asexual	3	0.8
Bisexual	55	15.4
Demisexual	3	0.84
Gay/Lesbian	13	3.7

Demographic Category	Participant Demographic Data	
	N	%
Heterosexual/Straight	220	61.8
Pansexual	9	2.5
Queer	2	0.56
Prefer not to disclose	6	1.7
Did not answer	45	12.6
Total	356	100
Disability, Impairment, Chronic Illness		
Yes	68	19.1
No	219	61.5
Prefer not to answer	8	2.2
Did not answer	61	17.1
Total	356	100
Significant Mental Health Concerns		
Yes	126	35.4
No	169	47.5
Prefer not to answer	4	1.1
Did not answer	57	16.0
Total	356	100
Yearly Household Income		
Under $5000	45	12.6
$5000-$9,999	20	5.6
$10,000-$19,999	50	14.0
$20,000-$29,999	42	11.8
$30,000-$39,999	25	7.0
$40,000-$49,999	14	3.9
$50,000-$59,999	24	6.7
$60,000-$74,999	20	5.6
$75,000-$99,999	21	5.9
$100,000 or more	49	13.8
Did not answer	46	12.9
Total	356	100
Guardian's Highest Level of Education		
Completed some high school, no diploma	4	1.1
High school diploma/GED	26	7.3
Some college credit, no degree	28	7.9
Associate's degree	31	8.7
Bachelor's degree	97	27.2
Master's degree	77	21.6
Doctoral degree/Professional degree	48	13.5
Did not answer	45	12.6
Total	311	100
International Student		
International student	6	1.7
Domestic student	304	85.4
Did not answer	46	12.9
Total	310	100

Demographic Category	Participant Demographic Data	
	N	%
Higher Education Degrees Obtained Prior to Doctoral Program		
Associate's degree	31	8.7
Bachelor's degree	287	80.6
Master's degree	124	34.8
Other Doctoral degree	1	0.3
Professional degree	5	1.4
Technical degree/certificate	12	3.4
Current Year in Doctoral Program		
1st year	78	21.9
2nd year	54	15.2
3rd year	92	25.8
4th year	53	14.9
5th year	20	5.6
6th year	12	3.4
7th year or more	3	0.8
Did not answer	44	12.4
Total	356	100
Number of Credits Completed for Current Degree		
0 – 29 credits	86	24.2
30 – 59 credits	63	17.7
60 – 89 credits	66	18.5
90 – 119 credits	57	16.0
120 – 149 credits	15	4.2
150 – 179 credits	2	0.6
180 credits or more	4	1.1
Did not answer	63	17.7
Total	356	100
Cumulative GPA		
4.0	118	33.1
3.99 - 3.80	108	30.3
3.79 - 3.50	38	10.7
3.49 - 3.30	8	2.2
3.29 - 3.00	6	1.8
2.99 or below	1	0.3
Did not answer	77	21.6
Total	356	100
Is Doctoral Program Funded?		
Yes	168	47.2
No	143	40.2
Did not answer	45	12.6
Total	356	100
What % of Program is Funded?		
100%	35	21.5
50-99%	101	61.9
49% or less	27	16.6
Total	163	100
Program Model		

Demographic Category	Participant Demographic Data	
	N	%
Cohort	215	60.4
Mentor	62	17.4
Other	27	7.6
Did not answer	52	14.6
Total	356	100
Prominent Program Tasks		
Academics	266	74.7
Research	253	71.1
Clinical practice	232	65.2
Teaching	70	19.7
Supervising	60	16.9
Research Expectations		
Solo dissertation	229	64.3
Group dissertation or scholarly project	51	14.3
Manuscript for publication	65	18.3
Complete project w/ empirical data	129	36.2
Present poster at conference	140	39.3
No Requirements	11	3.1
Other	32	9.0
Number of Presentation/Paper Authorships		
0 – 9	263	73.9
10 – 19	30	8.4
20 – 29	11	3.0
30 – 39	2	0.6
40 or more	1	0.3
Did not answer	49	13.8
Total	356	100
Clinical Expectations		
Full-time internship	240	67.4
Part-time internship	26	7.3
Practicum	237	66.6
Shadowing	50	14.0
Supervising other students	59	16.6
Average # of clinical hours per week		
0 – 10 hours	144	40.4
11 – 20 hours	75	21.1
21 – 30 hours	24	6.8
31 – 40 hours	45	12.6
41 – 50 hours	8	2.2
Did not answer	60	16.9
Total	356	100
Total practicum hours		
0 – 500 hours	198	55.6
501 – 1000 hours	56	15.7
1001 – 1500 hours	18	5.1
1501 – 2000 hours	15	4.2
2000 hours or more	20	5.6
Did not answer	49	13.8

Demographic Category	Participant Demographic Data	
	N	%
Number of practicum sites		
1 site	96	27.0
2 sites	49	13.8
3 sites	70	19.7
4 sites	34	9.6
5 sites	17	4.8
6 sites	7	2.0
7 or more sites	6	1.7
Did not answer	77	21.6
Total	356	100
Hours Working Campus Job/Assistantship		
0 hours	161	45.2
1 – 10 hours	51	14.3
11 – 20 hours	78	21.9
21 – 30 hours	4	1.1
31 – 40 hours	1	0.3
Did not answer	61	17.1
Total	356	100
Hours Working Job Unrelated to Degree		
0 hours	210	59.0
1 – 10 hours	47	13.2
11 – 20 hours	23	6.5
21 – 30 hours	7	1.9
31 – 40 hours	7	1.9
Did not answer	62	17.4
Total	356	100
Career Goals		
Academia/Teaching	30	8.4
Research	13	3.7
Clinical work	227	63.8
Consulting	6	1.7
Other	30	8.4
Did not answer	50	14.0
Total	356	100

Measures

Participants were asked to complete a demographics questionnaire, the New General Self-Efficacy Scale (Chen et al., 2001), the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (MSPSE; Bandura, 1989; Bandura, 2006), a brief version of the Self-Efficacy in Research Measure (Phillips & Russell, 1994; Kahn & Scott, 1997), the Physical Therapist Self-Efficacy scale (Venskus & Craig 2017), the

Multidimensional Scale Perceived Social Support (Zimet et al., 1988), the Openness to Diversity Scale (Pascarella et al., 1996) and the Social Desirability Scale-17 (Stöber, 2001). These questionnaires were in addition to completing the Self-Efficacy of Applied Doctoral Students scale (SEADS) developed in the present study.

Demographics Questionnaire

The demographics questionnaire asked participants to provide the following information: specific doctoral program/field of study, age, racial/ethnic identity, gender identity, sexual orientation, any disability or significant mental health concerns, annual income, parent/guardian's highest level of education, if they are an international student, degrees obtained prior to current doctoral program, year in program, number of credits completed for current degree, cumulative graduate GPA, if their program is funded, program model, prominent program tasks, program clinical and research expectations, number of authorships, average number of clinical hours per week, total number of clinical hours, number of practicum sites they worked at, number of hours working a campus job/assistantship or job unrelated to field of study, and career goals.

New General Self-Efficacy Scale (NGSE; Chen et al., 2001)

For convergent validity purposes, the New General Self-Efficacy Scale (Chen et al., 2001) was administered. This scale includes eight items assessing how much people believe they can achieve their goals. Participants rated their belief in their abilities, using a 5-point Likert-type scale (*1 = Strongly disagree, 5 = Strongly agree).* Examples of items include, "When facing difficult tasks, I am certain that I will accomplish them" and "Compared to other people, I can do most tasks very well." Higher scores indicate higher perceived self-efficacy.

This scale is normed on 316 undergraduates at a large U.S. university. Coefficient alphas range from .85 to .87 (Chen et al., 2001). Test-retest reliability over a period of one semester are .65, .66, and .62 and the NGSE has higher content and predictive validity than Sherer et al.'s (1982) General Self-Efficacy Scale (Chen et al., 2001). Reliability of the NGSE for the current study is .932.

Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (MSPSE; Bandura, 1989; Bandura, 2006)

For convergent validity purposes, the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Bandura, 1989; Bandura, 2006) was administered. This scale is a 57-item self-report measure with nine subscales. The Self-Efficacy for Self-Regulated Learning subscale consists of ten items intended to measure students' belief in their ability to accomplish learning related tasks (Bandura, 1989). Participants rated their confidence in their abilities using a 10-point Likert-type scale (*0 = Cannot do at all, 50 = Moderately can do, 100 = Highly certain can do).* Examples of items include "Finish my homework assignments by deadlines" and "Organize my schoolwork." Higher scores indicate higher perceived self-efficacy.

The MSPSE is normed on 3,670 students from grades four through eleven attending public schools in the suburban northeastern and southeastern United States (Usher & Pajares, 2008). Coefficient alpha of the Self-Efficacy for Self-Regulated Learning subscale is .83 (Usher & Pajares, 2008). Previous studies have shown similar reliability, with coefficient alpha ranging from .81 to .87 (Pajares & Valiante, 2002; Miller et al., 1999). An additional study explored the reliability of the MSPSE on 651 undergraduate students from a large midwestern university with a mean age of 20.06 years (Choi et al., 2001). They reported the coefficient alpha as .87 for the

Self-Efficacy for Self-Regulated Learning subscale, suggesting this measure may be appropriate for college age students. For the present study, reliability of the Self-Efficacy for Self-Regulated Learning subscale is .852.

Brief Version of the Self-Efficacy in Research Measure (SERM; Phillips & Russell, 1994; Kahn & Scott, 1997)

For additional support of convergent validity, a brief version of the Self-Efficacy in Research Measure (SERM; Phillips & Russell, 1994; Kahn & Scott, 1997) was administered. This scale is comprised of 12 items designed to measure an individual's perceived ability to perform several research related tasks. The brief version of the uses three items with the highest item to subscale correlations for each of the four subscales: Research Design Skills, Practical Research Skills, Quantitative and Computer Skills, and Writing Skills (Kahn & Scott, 1997). Participants indicated their degree of confidence in their ability to accomplish the tasks on a 9-point Likert-type scale *(1 = No confidence, 9 = Total confidence)*. Examples of items for the Research Design Skills subscale include, "Designing an experiment using traditional methods (e.g., experimental, quasi-experimental designs);" for the Practical Research Skills subscale, "Keeping records during a research project;" for the Quantitative and Computer Skills subscale, "Using multivariate statistics (e.g., multiple regression, factor analysis, etc.);" and for the Writing Skills subscale, "Writing a research presentation for a conference."

The SERM is normed on 125 doctoral students in counseling psychology from 12 different programs across the United States (Phillips & Russell, 1994). Coefficient alpha of the total score is .96 and for each of the subscales as follows: Research Design Skills = .90, Practical Research Skills = .83, Quantitative and Computer Skills = .93, and Writing Skills = .94 (Phillips & Russell, 1994). The validity of the total scores is supported by (a) significantly higher SERM

scores for advanced graduate students than beginning graduate students and (b) a .45 correlation between SERM total scores and a measure of research productivity (Phillips & Russell, 1994). The reliability of the SERM for the present study is .920.

Physical Therapist Self-Efficacy Scale (PTSE; Venskus & Craig 2017)

For convergent validity purposes, the Physical Therapist Self-Efficacy Scale (PTSE; Venskus & Craig, 2017) was administered. This scale is comprised of five items designed to measure physical therapy students' perceived ability in clinical reasoning. Participants rated their beliefs in their clinical abilities, using a 5-point Likert-type scale (*1 = Strongly disagree, 5 = Strongly agree).* Since this measure was designed specifically for physical therapy doctoral students, researchers in this study rephrased items to say, "clinical practice" or "clinical issues" instead of "physical therapy problems" and "PT practice." Examples of items include "I am confident I know how to assess the clinical issues being presented by the patient/client in my clinical practice" and "I believe that I can manage general clinical problems that a patient/client presents with."

The PTSE is normed on 71 students enrolled in the Doctor of Physical Therapy (DPT) degree at Marymount University (Venskus & Craig, 2017). A second study reported the coefficient alpha of the total score is .87 (Campbell et al., 2022). The five items accounted for 95.6% of the total variance explained and demonstrated higher scores for advanced graduate students than beginning graduate students (Venskus & Craig, 2017). The reliability of the PTSE for the current study is .873.

Multidimensional Scale Perceived Social Support (MSPSS; Zimet et al., 1988)

For convergent validity purposes, the Multidimensional Scale Perceived Social Support (Zimet et al., 1988) was administered. The MSPSS is comprised of twelve items designed to

measure a person's perceived social support (Zimet et al., 1988). The scale has three subscales, including Significant Other Subscale, Family Subscale, and Friends Subscale. Participants indicated their level of agreement with the statements on a 7-point Likert-type scale *(1 = Very Strongly Disagree, 7 = Very Strongly Agree).* An example of an item for the Significant Other Subscale includes, "There is a special person with whom I can share joys and sorrows"; for the Family Subscale, "I get the emotional help & support I need from my family"; and for the Friends Subscale, "I can talk about my problems with my friends" (Zimet et al., 1988).

The MSPSS is normed on 275 undergraduates from Duke University (Zimet et al., 1988). Coefficient alpha of the total score is .88 and for each of the subscales as follows: Significant Other = .91, Family = .87, and Friends = .85 (Zimet et al., 1988). Test re-test reliability over a period of three months is .85 for the total scale and .72 for the Significant Other Subscale, .85 for the Family Subscale, and .75 for the Friends Subscale (Zimet et al., 1988). For the present study, reliability of the total score of the MSPSS is .852 and for each of the subscales as follows: Significant Other = .97, Family = .92, and Friends = .92.

Openness to Diversity Scale (ODS; Pascarella et al., 1996)

For convergent validity purposes, the Openness to Diversity Scale (Pascarella et al., 1996) was administered. The ODS consists of eight items designed to measure a college student's openness to diversity and challenge (Pascarella et al., 1996). Participants indicate their level of agreement using a 5-point Likert-type scale (*1 = Strongly disagree, 5 = Strongly agree).* Examples of items include "I enjoy having discussions with people whose ideas and values are different from my own" and "Learning about people from different cultures is a very important part of my college education." The ODS is normed on 3,331 freshmen college students from eighteen different universities across fifteen different states in the US (Pascarella et al., 1996).

Coefficient alpha of the total score is .83 and test-retest reliability over a period of one academic year is .84. The reliability of the ODS for the present study is considered very good at .838.

Social Desirability Scale-17 (SDS-17; Stöber, 2001)

For discriminant validity purposes, the Social Desirability Scale-17 (SDS-17; Stöber, 2001) was administered. The SDS-17 consists of 17 items designed to measure the degree to which a person tries to portray themselves positively (Stöber, 2001). Participants will indicate if a statement describes them or not on a true (coded = 1) or false (coded = 0) scale. Example items include, "In traffic I am always polite and considerate of others" and "I would never live off other people." The SDS-17 demonstrates validity in the United States as it was tested on 800 individuals, including college students and a demographically diverse adult sample (Blake et al., 2006). The reliability of the SDS-17 for the present study using Kuder-Richardson-20 analysis is .811.

SEADS Scale Development Steps

DeVellis's (2017) eight steps to scale development were followed in the construction of the Self-Efficacy of Applied Doctoral Students (SEADS) Scale. The first step consisted of construct identification and exploration (DeVellis, 2017). The SEADS is a measure of HPT doctoral students' belief in their abilities to succeed in all the domains of graduate school, including academic skills, research skills, clinical skills, relationships skills, and DEI-related skills. The scale was organized around Bandura's Social Cognitive Theory (SCT) which explains how individuals maintain their behavior through reinforcement to achieve goal directed behaviors over long periods of time (Bandura, 1991).

More specifically, SCT explains how behavior is maintained through five basic human capabilities of symbolizing, forethought, vicarious learning, self-regulation, and self-reflection

(Bandura, 1991). SCT defines self-efficacy as the construct that allows individuals to gather and evaluate information about their capabilities, which in turn helps determine if an individual will initiate behaviors, how much effort they will expend, and how long they will sustain it (Stajkovic & Luthans, 2001). The specific domains of self-efficacy to be evaluated were pulled from the literature on training and education and include academic skills, research skills, clinical skills, relationship skills, and skills related to DEI.

Step two was to generate an item pool (see Appendix A, B, and C for specific items) (DeVellis, 2017). We generated an item pool by developing definitions for the constructs, encompassing the constructs missing from the literature, and following Bandura's (2006) recommendations for self-efficacy scale development, including that items are domain specific, focus on ability versus self-worth, ask about present abilities, not future, and the item stems include versions of "I can" or "I believe I can." Care was taken to ensure reading levels were appropriate for graduate students and to avoid double-barreled items, lengthy items, and ambiguity (DeVellis, 2017). 107 items were generated, around 15 items for each subscale (Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Peer Relationship Self-Efficacy, Advisor Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy, and DEI Self-Efficacy).

The third step was to determine the format for measurement (DeVellis, 2017). The standard methodology for formatting self-efficacy scales involves individuals being presented with different levels of task demands and they rate their belief in their ability to complete the tasks (Bandura, 2006). Responses for the strength in their self-efficacy beliefs ranged from 1 *(Not at all confident)* to 5 (*Very confident).* Such response options are displayed horizontally across the screen, with 1 on the left, followed by 2, 3, 4, and 5 sequentially, which helps

participants discriminate meaningfully between response options (Bandura, 2006). A neutral option was added to represent a true midpoint between no confidence and complete confidence (Chyung et al., 2017).

Step four in scale development was evaluating how the items are written, including examining language, length, and structure (DeVellis, 2017). An expert panel reviewed the items and provided feedback on the relevance and necessity of each item for what we intend to measure (DeVellis, 2017). They also provided feedback on item classification (e.g., which factor it would load under), item conciseness, item clarity, and general feedback about missing factors (DeVellis, 2017). Expert reviewers, detailed in the next paragraphs, additionally were able to provide feedback on the Likert scale response options, individual items, and the overall scale.

The expert reviewers were (1) Cindy Juntunen, Ph.D., L.P. (Counseling Psychology), (2) Keri Frantell, Ph.D. (Counseling Psychology), (3) Sarah Nielsen, Ph.D., O.T.R./L., FAOTA (Occupational Therapy) (4) Casey (Carolyn) Ozaki, M.Ed., Ph.D. (Higher Education), (5) Cindy Flom-Meland, P.T., M.P.T., Ph.D. (Physical Therapy), (6) Jana Zwiling, Ph.D., F.N.P.-C. (Nursing), (7) Kristen Hicks Roof, Ph.D., RDN, LDN, CLC, FAND (Nutrition/Dietetics), (8) Rhoda Owens, Ph.D., R.N. (Nursing), and (9) Lawanna Pierce, Ph.D., MSW (Social Work).

Expert reviewer one was Dr. Cindy Juntunen, the Dean of the College of Education and Human Development at the University of North Dakota. She received her Ph.D. in Counseling Psychology at the University of California, Santa Barbara. Her research interests include issues in training and supervision, professional issues and identity, and training and counselor development. She has also served on the Council of Counseling Psychology Training Programs.

Dr. Keri Frantell, the second reviewer, is a licensed psychologist at the University of Utah Counseling Center. She was previously an assistant professor in the Department of

Counseling Psychology and Community Services at the University of North Dakota. Dr. Frantell obtained her Ph.D. in Counseling Psychology from the University of Tennessee—Knoxville. Her research interests are based in promoting social justice and multiculturalism within group dynamics and sexual and gender minority mental health. Additionally, she has a background in scale development and exploratory factor analysis.

The third reviewer, Dr. Sarah Nielsen, is an associate professor in the Department of Occupational Therapy at the University of North Dakota. She received her Ph.D. in Institutional Analysis and Adult Learning from North Dakota State University. She has served on various graduate committees, including the Department Curriculum Committee and Department Entry-level Doctorate Committee and has been awarded for her work as a teacher and researcher. Dr. Nielsen's research interests include the scholarship of teaching and learning primarily focused on developing critical thinking and using service learning.

Expert reviewer four was Dr. Casey Ozaki, a Professor and Department Chair in the College of Education, Health and Behavior at the University of North Dakota. She obtained her Ph.D. in Higher Education from Michigan State University. Her research interests include higher education, diversity, equity, and inclusion (DEI), and college student persistence. Additionally, Dr. Ozaki has served on several dissertation committees on topics of doctoral student education, student advising, and perceptions of college students.

Dr. Cindy Flom-Meland, the fifth reviewer, is a Professor and Chair of the Department of Physical Therapy at the University of North Dakota, as well as current President of the American Physical Therapy Association (APTA) North Dakota. She received her MPT and Ph.D. in Teaching and Learning from the University of North Dakota. She teaches in the areas of communication and professional behavior, leadership, and teaching and learning.

The sixth reviewer was Dr. Jana Zwilling, who is a Clinical Assistant Professor in Nursing at the University of North Dakota. She earned her Ph.D. in Nursing from the University of Nebraska Medical Center. Her research interests include healthcare policy, barriers to practice, and nurse practitioner workforce and utilization.

Expert reviewer seven was Dr. Kristen Hicks-Roof, an associate professor in Nutrition & Dietetics at the University of North Florida. She received her Ph.D. in Nutrition from Texas A&M University. Her research interests focus on program development, interprofessional education, and communication among the healthcare team. Dr. Hicks-Roof has also earned several awards for her work as a professor and mentor.

Dr. Rhoda Owens was the eighth reviewer and an associate professor in Nursing at the University of North Dakota. She obtained her MS in Nursing and Ph.D. in Teaching and Learning- Higher Education from the University of North Dakota. Her research interests include professional identity development of nurses and has extensive institutional experience serving on education, hiring, and admissions committees.

The ninth and final expert reviewer was Dr. Lawanna Pierce, the Dean of the College of Behavioral & Social Sciences and a professor of graduate social work at Northwest Nazarene University. She received her Ph.D. in Social Work from the University of Texas Austin. She also has experience serving as a social work program field director, director of an MSW program, and department chair.

These expert reviewers provided quantitative and qualitative feedback on the usefulness of each item (1 = necessary; 2 = useful but not necessary; 3 = not necessary); on item classification (e.g., which factor it would load under), item conciseness, item clarity, and definitions of the constructs. Results from the expert review panel demonstrated strong

agreement on item to subscale match (e.g., items we expected to fit under research self-efficacy, expert reviewers agreed with). The vast majority of items received a rating of "1" or "2", indicating they are necessary or useful and none of the reviewers suggested additional items to add to the scale. Additionally, reviewers reached consensus on the five domains of HPT doctoral student self-efficacy (Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy).

In terms of specific feedback, one reviewer suggested changing the item stem to "I am confident in my ability to" (to target the participants' beliefs in their ability) rather than the originally proposed "I can," which may focus more on behavior or physical abilities. We took this suggestion and changed all item stems to reflect this recommendation. Many reviewers expressed concern over the Academic Self-Efficacy items being "too elementary." We decided to keep these items as they reflected the formatting and specificity of other general academic self-efficacy scales (Bandura, 1989; Owen & Robin, 1988) and reviewers agreed academic self-efficacy is a component of HPT doctoral student self-efficacy.

Several reviewers also expressed concern about whether the Relationship Self-Efficacy items were addressing a student's ability to build/maintain a relationship or if the items were asking more about the personality and quality of the advisor/clinical supervisor. To remedy this, we added the following instructions to be read prior to answering relationship self-efficacy items, "For the following questions, your advisor and clinical supervisor can be from a group/individual setting and can be from a past/current relationship. Try to separate out your sense of skills from who your actual advisor or supervisor is." A similar concern was expressed about several DEI items. Expert reviewers commented that the items were not asking about a student's belief in their ability to implement/reflect on DEI, but instead a reflection of the program's cultural

environment. We decided to retain all these items as helping professionals need self-efficacy to handle DEI concerns in order to engage with others across different social identities (Perez et al., 2020). Additionally, it was considered these items may be tapping into a more specific DEI self-efficacy.

DeVellis's (2017) fifth step of scale development is the consideration and inclusion of validity items. Six validity items were added throughout the ten measures given, including items such as "Please select the answer '4- Fairly Confident'" and "Please select the answer 'No Confidence.'" Additionally, all participants had to pass a Captcha Verification. Participants were dropped from the sample if they did not attend to most of these items (N = 3). A measure of social desirability both as a measure of discriminant validity and to determine if items are strongly correlated with social desirability (DeVellis, 2017). To assess convergent validity, the following measures were given: Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (MSPSE; Bandura, 1989; Bandura, 2006), a brief version of the Self-Efficacy in Research Measure (Phillips & Russell, 1994; Kahn & Scott, 1997), the Physical Therapist Self-Efficacy scale (Venskus & Craig 2017), the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988), the Openness to Diversity Scale (Pascarella et al., 1996). These measures were used to serve as evidence of the construct and convergent validity of the SEADS.

Administering the scale to a developmental sample was step six of the scale development process. DeVellis (2017) emphasizes the importance of obtaining a large (~300 individuals) and diverse sample to help reduce the effects of chance, constriction of range, and to increase identity representation within the population (DeVellis, 2017). A small, pre-pilot study (N = 6) was conducted to gain preliminary feedback on the items, measure time to complete survey, receive

feedback about understanding of the scale prompts, assess flow of survey, and overall scale cohesion. Following this pilot, the exploratory phase of this study was conducted, in which (N = 356) participants were included.

The seventh step was to evaluate the items to identify which items form the scale (DeVellis, 2017). This process is detailed in the data analysis section below (DeVellis, 2017), and includes item analysis, factor structure, analysis of construct, convergent, and discriminant validity, and reliability analysis. The eighth and final step of scale development is to optimize the scale length, which consists of balancing brevity with reliability, dropping "bad" items, and potentially eliminating items with the lowest item-scale correlations (DeVellis, 2017). As discussed below, 31 items were dropped from the original SEADS due to poor factor loading, cross loading, and restricted range. Following these eight steps, the SEADS was created, reviewed, piloted, and optimized to create a revised 76-Item SEADS. Further explanation of the survey procedures and statistical analyses are discussed below.

Procedures

Survey development procedure

Following approval from the Institutional Review Board (IRB0003312) from the University of North Dakota, participants completed the survey on Qualtrics. The survey included informed consent, demographic information questions and the Self-Efficacy of Applied Doctoral Students Scale (SEADS), and then randomly-ordered validity scales (i.e., New General Self-Efficacy Scale [Chen et al., 2001], the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy [Bandura, 1989; Bandura, 2006], a brief version of the Self-Efficacy in Research Measure [Phillips & Russell, 1994; Kahn & Scott, 1997], the Physical Therapist Self-Efficacy scale [Venskus & Craig 2017], the Multidimensional

Scale Perceived Social Support [Zimet et al., 1988], the Openness to Diversity Scale [Pascarella et al., 1996] and the Social Desirability Scale-17 [Stöber, 2001]).

Participants had to consent prior to accessing the survey and had the option to check "Yes, I consent" or "No, I do not consent" to engage in the survey. Following consent, participants were asked if they are currently enrolled in a professional or behavioral health doctoral program. If yes, they were prompted to provide the field and degree program they are currently enrolled in. Following these questions, the 107-Item SEADS was presented, followed by randomized validity scales, and demographic information questions in a multiple choice and fill in the blank format. Participants were informed they could discontinue the survey at any time. After completion of the survey, participants viewed a debriefing page that provided a thank you for participating, the researchers' contact information, the purpose of the study, expected benefits and potential risks for participation, as well as resources for mental health support. Participants were not compensated for their participation. The survey had an average time completion of 19 minutes.

The data was reviewed after collection to ensure "clean and complete data that is effective for the provision of quality data" (Karmaker & Kwek, 2006, p. 547). Participants that missed any data points from the Self-Efficacy of Applied Doctoral Students Scale, engaged in "long-streaming," did not pass the accuracy/validity checks, or who missed more than 20% of items on the validity scales were considered incomplete and removed from the study (N = 383 removed). Missing at random (MAR) and nonmonotone missing completely at random (MCAR) methods were used in the present study to determine that the missing data were missing completely at random (Nassiri et al., 2018).

Data imputation procedures were conducted prior to other statistical analyses, though only on non-demographic measures other than the SEADS. Data imputations were completed for 17 of 327 participants. Out of 23,544 data points (327 participants answering 72 non-demographic items), a total of 18 data points were imputed. The convergent validity scales (New General Self-Efficacy Scale, the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy, a brief version of the Self-Efficacy in Research Measure, the Physical Therapist Self-Efficacy scale, the Multidimensional Scale Perceived Social Support, the Openness to Diversity Scale) were all found to have data MCAR. The discriminant validity scale, the Social Desirability Scale-17 demonstrated data that was MCAR.

Results

This chapter's purpose is to detail the results of the development of the Self-Efficacy of Applied Doctoral Students Scale (SEADS). Specifically, evidence from the SEADS exploratory pilot study, including factor structure, reliability, and validity, is presented. The factor structure of the SEADS was re-evaluated through an EFA. Construct, convergent, and discriminant validity, as well as reliability, were also assessed.

Preliminary Analysis

This section details information on the preliminary analysis of the exploratory data, which provides evidence for proceeding with conducting an EFA. Sampling adequacy was determined through Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin test. The Kolmogorov-Smirnov (KS) and Shapiro-Wilk (SW) tests and review of a histogram were used to assess data normality.

Sampling Adequacy

Evaluating sampling adequacy starts with Bartlett's test of sphericity (Bartlett, 1953) and the Kaiser-Meyer-Olkin test (KMO; Kaiser, 1974). Bartlett's test of sphericity determines whether correlations in the data are strong enough to utilize a dimension reduction technique (Williams et al., 2010) by analyzing sample size, number of variables, and $\log_{10}$ of the determinant of the correlation matrix (Dziuban & Shirkey, 1974). This test should be significant ($p < .05$) for factor analysis to be suitable (Hair et al., 1995). The KMO predicts if data will be appropriate for a factor analysis. It provides an index range from 0 to 1, with indices greater than or equal to 0.50 considered to be suitable for factor analysis (Hair et al., 1995).

For the 107-Item SEADS, the KMO value was .93. The KMO value for a shortened version of the SEADS, the 76-Item SEADS, was also .93. In terms of specifics subscales of the SEADS: For the Clinical Self-Efficacy subscale, the KMO value was .950; the for the DEI Self-Efficacy subscale the KMO value was .931; for the Advisor Relationship Self-Efficacy subscale the KMO value was .944; For Research Self-Efficacy subscale, the KMO value was .911; for the Peer Relationship Self-Efficacy subscale the KMO value was .927; For Clinical Supervisor Relationship Self-Efficacy subscale, the KMO value was .910. These values exceed the minimum value of .50 recommended for factor analysis (Kaiser, 1974). Values between .90 and 1.00 are considered "marvelous" and indicate a significant level of factorability of the variables included in the SEADS (Beavers et al., 2013, p. 4).

Barlett's Test of Sphericity revealed a χ^2 of 30,454.230 ($df = 5671$, $p < .001$) for the 107-Item SEADS. For the 76-Item SEADS, the test revealed a χ^2 of 21,013.525 ($df = 2850$, $p < .001$). When tested by subscale, Bartlett's Test of Sphericity showed a χ^2 of 3959.946 ($df = 105$, $p < .001$) for the Clinical Self-Efficacy subscale, a χ^2 of 3875.015 ($df = 136$, $p < .001$) for the

DEI Self-Efficacy subscale, a χ^2 of 3817.821 (df = 66, p < .001) for the Advisor Relationship Self-Efficacy subscale, a χ^2 of 3875.955 (df = 105, p < .001) for the Research Self-Efficacy subscale, a χ^2 of 2846.671 (df = 55, p < .001) for the Peer Relationship Self-Efficacy subscale, and a χ^2 of 1851.555 (df = 21, p < .001) for the Clinical Supervisor Relationship Self-Efficacy subscale. These values demonstrate evidence of sampling adequacy and suitability of proceeding with factor analysis.

Data Distribution

Before completing factor analysis, it is critical to assess the normality of the data, as this is the underlying assumption for most statistical tests (Mishra et al., 2019). If data does not follow a bell-shaped distribution, then it may perform poorly on traditional statistical tests and outcomes may be skewed (Sainani, 2012). Analysis of the means and standard deviations revealed means that were slightly positively skewed for the 107-Item SEADS. The means for the subscales on the 76-Item SEADS also had a positive skew, particularly the Clinical and Peer Relationship Self-Efficacy subscales (see Table 2). The average mean item across the 76-Item SEADS was 3.99, which indicates the average response was close to the center of the 5-point Likert scale, although slightly positively skewed.

The Kolmogorov-Smirnov (KS) and the Shapiro-Wilk (SW) tests are the most widely used methods to test for the normality of data (Mishra et al., 2019). For the both the 107-Item SEADS and 76-Item SEADS, the KS and SW tests were significant, suggesting non-normality of the data (see Table 3). However, it has been argued that parametric tests are robust enough to yield unbiased results when analyzing Likert scale responses despite violations of data normality (Norman, 2010; Sullivan & Artino, 2013). Therefore, the preliminary analyses indicated the

suitability of conducting an EFA with the SEADS and provided evidence for the necessity of utilizing a statistic that does not assume normality, such as maximum likelihood in the EFA.

Table 2

Means and Standard Deviations of the 107 and 76-Item SEADS

Scale/Subscale	Mean range	Standard Deviation range
107-Item SEADS	2.75 - 4.88	.347 - 1.285
76-Item SEADS	2.75 - 4.81	.460 - 1.262
Clinical SE	4.02 - 4.81	.460 - 0.974
DEI SE	3.70 - 4.49	.680 - 1.064
Advisor SE	3.25 - 4.35	.882 - 1.258
Research SE	2.75 - 3.87	.982 - 1.217
Peer SE	3.71 - 4.54	.679 - 1.123
Clinical Supervisor SE	3.53 - 4.40	.767 - 1.141

Table 3

Normality of the Data (Kolmogorov-Smirnov and Shapiro-Wilk tests)

Scale	Kolmogorov-Smirnov (KS)		Shapiro-Wilk (SW)	
	D	p-value	D	p-value
107-Item SEADS	.182 - .522	< .001	.381 - .912	< .001
76-Item SEADS	.182 - .488	< .001	.435 - .912	< .001

Main Analysis

The main analyses included assessment of the factor structure via exploratory factor analysis (EFA) using a Maximum Likelihood rotation. The internal validity was assessed by analyzing Cronbach's coefficient alphas and construct validity by reviewing Pearson's r correlations with measures of convergent and divergent validity.

Factor Analysis

Guidelines for conducting factor analysis. Exploratory factor analysis (EFA) is an analytic tool that is used to determine how many constructs or latent variables exist within a set of items (DeVellis, 2017). It can also condense information to explain variation using fewer and new variables (DeVellis, 2017). EFA is also used to identify how well items are performing and if they fit into the factorially defined variables (DeVellis, 2017). When conducting an EFA, researchers must consider which estimation method to utilize, how many factors to retain, and the type of rotation method to use (Fabrigar et al., 1999).

The first step in factor analysis is factor extraction (Fabrigar et al., 1999). The purpose of factor extraction is to maximize the amount of variance explained through the fewest number of latent variables (Mvududu & Sink, 2013; de Winter & Dodou, 2012). Maximum likelihood is one of the most used estimation methods in exploratory factor analysis (Watson, 2017) and is the estimation method used in this study. There are numerous advantages to using maximum likelihood estimation, including how it "allows for the computation of a wide range of indexes of the goodness of fit of the model. [Maximum likelihood] also permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals for these parameters" (Fabrigar et al., 1999, p. 277).

Factor rotation identifies clusters of variables that are similar and characterized by mainly one factor/variable (DeVellis, 2017). This process makes it easier to interpret by changing the vantage point in which data is viewed (DeVellis, 2017). By rotating factors to more desirable positions, researchers can maximize high loadings and create the simplest factor structure (Dimitrov, 2012).

Orthogonal and oblique rotations are the two most common rotation techniques (Williams et al., 2010) and are chosen based on the hypothesized relationship between factors. Orthogonal rotation is utilized when the factors are assumed to be unrelated (Mvududu & Sink, 2013) and oblique rotation is utilized when low to moderate correlations are expected between factors (Watson, 2017). The Varimax rotation maximizes variance by increasing the squared correlations for each item (Dilbeck, 2017). It is the most used orthogonal rotation method (Dimitrov, 2012), the easiest to interpret (DeVellis, 2017), and the rotation method used in the current study.

Following the estimation and rotation of factors, consideration of how many factors to retain follows. Extracting factors through nonstatistical methods helps determine the amount of information each factor contains and when a parsimonious account of the factors is reached (DeVellis, 2017). Eigenvalues represent how much information is captured by a single factor and are one nonstatistical method to determine how many factors to retain (DeVellis, 2017). Only factors with eigenvalue higher than 1.0 should be retained (Kaiser, 1960).

The scree test (Cattell, 1966) is a second nonstatistical method to help with this determination through a visual plot of eigenvalues in descending values (DeVellis, 2017; Fabringer et al., 1999). The number of factors to retain is based on examining where the scree plot "elbows" and there is a distinct transition from vertical to horizontal (DeVellis, 2017). It is suggested to retain any factors that lie above the elbow of the scree plot (DeVellis, 2017).

The strength of loadings on each factor should also be considered when determining the number of factors to retain. Generally, factors with communalities from .40 to 1.00 (Pett et al., 2003), with more than three items (Pett et al., 2003), and no or few item cross loadings (Costello & Osborne, 2005) represent good factor structure. The larger the sample size, the smaller item

loadings can be and retain significance (Stevens, 2002). In a sample of 300, only items with factor loadings above .32 (10% overlapping variance) should be retained (Tabachnick & Fidell, 2007). However, ultimately the exact choice of item loading cutoffs is up to the researcher's preference (Tabachnick & Fidell, 2007).

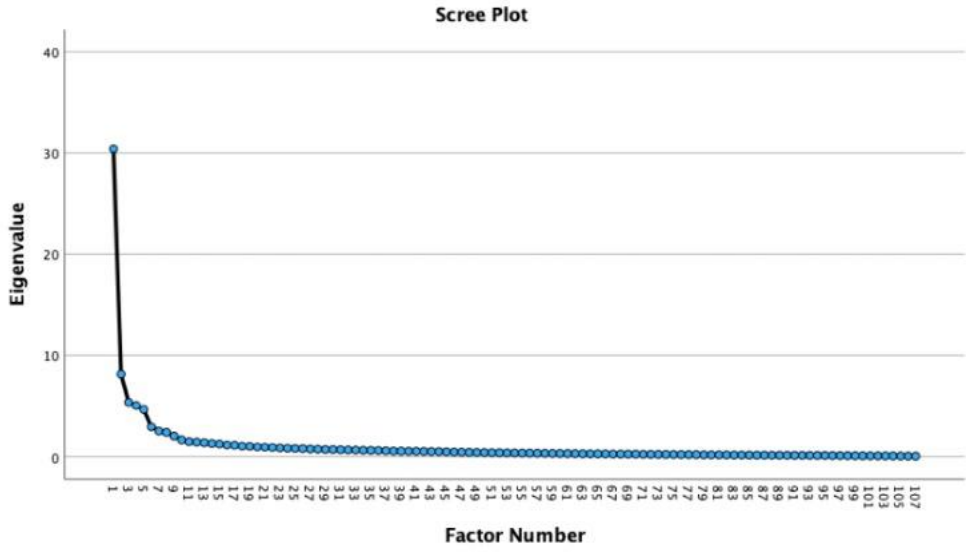
Factor Structure (Hypothesis 1A, 1B, 1C)

There were three outcomes hypothesized for the factor structure of the 107-Item SEADS. It was first hypothesized that five unrelated factors would emerge within the 107-Item SEADS. These five factors were expected to reflect five distinct domains of doctoral student self-efficacy, including Academic Self-Efficacy; Research Self-Efficacy; Clinical Self-Efficacy; Relationship Self-Efficacy; and Diversity, Equity, and Inclusion (DEI) Self-Efficacy. It was alternatively hypothesized that five related factors would emerge that reflect the above five aspects of doctoral student self-efficacy. The third hypothesis was that the 107-Item SEADS would be composed of two unrelated subscales, Graduate Skills Self-Efficacy (academic and research skills) and Relational Self-Efficacy (clinical skills and relationship skills).

107-Item SEADS. An exploratory factor analysis was conducted with all 107 items of the SEADS, utilizing SPSS. The estimation method used was Maximum likelihood with an orthogonal rotation, more specifically, a Varimax rotation (Dilbeck, 2017). The SEADS generated an eight-factor structure solution, as evidenced by the scree plot which "elbowed" at point eight (DeVellis, 2017) (See Figure 1). The eight-factor structure was further supported by eigenvalues above one and a total variance accounted for (across the eight factors) of 50.1%.

Figure 1

Scree Plot with 107 Original Items, Utilizing Maximum Likelihood Factoring with Varimax Rotation



Upon further analysis of the item loadings on the rotated factor matrix, it was determined that items loaded across eight different factors (See Table 4). The predicted five factors emerged, Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy, and DEI Self-Efficacy. However, an additional three factors emerged related to Relationship Self-Efficacy, as items on this scale loaded onto their own factors based upon the specific relationship (e.g., peer, advisor, and supervisor). The predicted Research Self-Efficacy factor was also divided into two separate factors, including Research Writing and Design Self-Efficacy and (separately) Statistical Analysis Self-Efficacy. There was also an additional DEI factor that emerged, with items reflecting a focus on seeking help to address issues of DEI.

In terms of the breakdown of each of these factors based on the EFA, the following patterns were identified in the data. The first factor, Clinical Self-Efficacy, included items aimed at exploring doctoral students' belief in their ability to complete basic clinical tasks in their applied field. This factor accounted for 9.3% of the variance of the total scale. This subscale was originally made up of 15 items that loaded as expected on this factor (factor loadings ranging from .471 - .769). Four items from the Clinical Supervision Self-Efficacy subscale cross-loaded

onto this factor (*"4. I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor," "7. I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor," "10. I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor,"* and *"11. I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor"*) and one item from DEI (*"19. I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients"*). These five items were flagged for further consideration regarding revision or removal.

The second factor, Diversity, Equity, and Inclusion Self-Efficacy included items that measured doctoral students' belief in their ability to address issues of DEI in their own behaviors, the environments they are in, and within each of the other domains of doctoral student self-efficacy. This factor accounted for 9% of the variance of the total scale. This subscale originally consisted of 31 items. Twenty of the expected 31 items written for DEI Self-Efficacy loaded on this factor (factor loadings ranging from .357 - .782). One item from the Peer Relational Self-Efficacy subscale cross-loaded onto this factor (*"10. I am confident in my ability to provide resources/materials for peers in my doctoral program."*). This item was flagged for further consideration regarding revision or removal.

The third factor, Advisor Relationship Self-Efficacy, included items that were intended to explore doctoral students' belief in their ability to communicate with, navigate through, and maintain a relationship with their advisor. This factor accounted for 8.3% of the variance of the total scale. All original 11 items written for this subscale loaded onto this factor (factor loadings ranging from .593 - .829). In addition, one item from the Diversity, Equity, and Inclusion Self-Efficacy subscale fully loaded on this factor (*"26. I am confident in my ability to seek support*

from my doctoral advisor following a microaggression"), while two items from the DEI subscale cross-loaded onto this factor (*"27. I am confident in my ability to provide my advisor feedback about issues of diversity, equity, and inclusion"* and *"28. I am confident in my ability to accept feedback about my multicultural competency from my doctoral advisor"*). These three items were flagged for further consideration regarding revision or removal.

The fourth factor, Peer Relationship Self-Efficacy, included items that assessed doctoral students' belief in their ability to build, navigate, and maintain relationships with fellow peers in their programs. This factor accounted for 7.3% of the variance of the total scale. All 12 of the original items written for the Peer Relationship Self-Efficacy subscale loaded on this factor (factor loadings ranging from .374 - .845). In addition, one item written for the Academic Self-Efficacy subscale (*"9. I am confident in my ability to collaborate with other students on projects in doctoral level classes."*) and one item written for the DEI Self-Efficacy subscale ("25. *I am confident in my ability to be myself around members of my program."*) fully loaded on this factor. These two items were flagged for further consideration regarding revision or removal.

The fifth factor, Clinical Supervisor Relationship Self-Efficacy, included items that explored doctoral students' belief in their ability to communicate with, seek assistance from, and maintain a relationship with their clinical supervisor/preceptor. This factor accounted for 5% of the variance of the total scale. The original 11 items written for the Clinical Supervisor Relationship Self-Efficacy subscale loaded on this factor (factor loadings ranging from .411 - .746). Four items cross-loaded onto the Clinical Self-Efficacy subscale as mentioned in the above paragraphs.

The sixth factor, Research Writing and Design Self-Efficacy subscale, included items that assessed doctoral students' belief in their ability to design a research study, implement the study,

and write each section of a research paper. This factor accounted for 4.6% of the variance of the total scale. Six of the expected 15 items written for the Research Self-Efficacy subscale loaded on this factor (factor loadings ranging from .352 - .693). Three items from the Statistical Self-Efficacy subscale (*"3. I am confident in my ability to critique research methodology at the doctoral level," "4. I am confident in my ability to choose an appropriate methodology for my doctoral research study," "13. I am confident in my ability to write a results section that meets doctoral level expectations"*) and two items from the Academic Self-Efficacy subscale (*"7. "I am confident in my ability to write a paper at the doctoral level"* and "*12. I am confident in my ability to format a paper correctly according to doctoral level expectations."*) cross-loaded onto this factor. These five items were flagged for further consideration regarding revision or removal.

The seventh factor, Statistical Analysis Self-Efficacy, included items that explored doctoral students' belief in their ability to utilize data analysis software, accurately analyze data, and understand analysis results. This factor accounted for 3.8% of the variance of the total scale. Seven of the expected 15 items written for the Research Self-Efficacy subscale loaded on this factor (factor loadings ranging from .408 - .905).

The eighth factor, Seeking Support for DEI Self-Efficacy, included items that assessed doctoral students' beliefs in their ability to seek support after experiencing oppression or discrimination. This factor accounted for 3.4% of the variance of the total scale. Four of the original items from the DEI subscale fully loaded on this factor (factor loadings ranging from .496 - .856). One item from the DEI subscale cross-loaded on this factor (*"26. I am confident in my ability to seek support from my doctoral advisor following a microaggression."*). This item was flagged for further consideration regarding revision or removal.

Of note, four of the original items from the Academic Self-Efficacy subscale fully loaded on a ninth factor, which accounted for 2.697% of the variance of the total scale. Seven items cross-loaded across several factors. This factor was not included in the 107-item scale due to items cross loading, poor item loadings, and the scree plot suggesting eight factors present.

Hypothesis 1B. Hypothesis 1B predicted that five related factors would emerge that reflect five domains of doctoral student self-efficacy, academic, research, clinical skills, relationship, and DEI. This hypothesis was unsupported as the scree plot "elbowed" at seven factors and only accounted for a total variance of 27.7%. Upon further evaluation, factor loadings ranged from .179 - .701. Many of the academic and research items fell below .40 (*"2. I am confident in my ability to perform well on tests in my doctoral program"* and "*8. I am confident in my ability to understand doctoral level data analysis*"). This factor structure also did not cover the range of activities that were predicted (e.g., academic and research self-efficacy).

Hypothesis 1C. The third hypothesis predicted that the 107-Item SEADS would be composed of two unrelated subscales, Graduate Skills Self-Efficacy (academic and research skills) and Relational Self-Efficacy (clinical skills and relationship skills). This hypothesis was unsupported, as the scree plot "elbowed" at seven factors and only accounted for a total variance of 34.8%. Factor one, Relationship Self-Efficacy, accounted for 20.3% variance of the total scale. Upon further analysis, 33 of the expected 34 items from Relationship Self-Efficacy subscale (e.g., peer, advisor, and supervisory relationships) loaded onto the factor (factor loadings ranging from .448 - .678). Two items from Clinical Supervisor Relationship Self-Efficacy cross loaded onto factor two. Thirty of the 31 DEI items also loaded on this factor (factor loadings ranging from .337 - .683). Six of the DEI items cross loaded onto factor two.

Factor two, Graduate Skills Self-Efficacy, explores doctoral students' belief in their ability to accomplish tasks related to their duties as a doctoral student, e.g., academic and research skills. Twenty-five of the 27 Academic and Research Self-Efficacy items loaded onto this factor (factor loadings ranging from .226 - .701). Five of these items cross-loaded onto factor one. Not in line with the hypothesis, all 15 Clinical Self-Efficacy items loaded onto factor two (factor loadings ranging from .365 - .669). Three of these items cross-loaded onto factor one. Both hypothesis 1B and 1C would need to be followed up with confirmatory factor analysis (CFA), as an EFA is not the best place to explore these hypotheses. However, that analysis is out of the scope of this study.

While the results of the EFA for the original 107-Item SEADS do not fully support the originally proposed five-factor structure, the five-factor structure held up the best amongst all three hypotheses. These results are still exploratory and will need to be further confirmed with a confirmatory factor analysis.

Table 4

Factor Structure and Item Loadings of the 107-Item SEADS

	1	2	3	4	5	6	7	8	9
Clinical Self-Efficacy									
1. I am confident in my ability to master the skills needed to be successful in my field's doctoral clinical practicum.	**.554**	.142	.082	.095	.097	.323	.044	.022	.209
2. I am confident in my ability to achieve my clinical goals during my field's doctoral clinical practicum.	**.646**	.110	.110	.197	.102	.172	-.014	.045	.237
3. I am confident in my ability to show empathy towards my clients/patients.	**.502**	.158	.126	.230	.061	.067	.023	.037	.043
4. I am confident in my ability to successfully implement clinical interventions according to my field's expectations.	**.766**	.168	.102	.088	.085	.059	.072	.029	.053
5. I am confident in my ability to accurately assess a client/patient's problems.	**.724**	.208	.103	.051	.044	.125	.082	.035	.077
6. I am confident in my ability to receive and integrate feedback about my doctoral level clinical work.	**.583**	.209	.153	.092	.170	.172	.031	.012	.043

	1	2	3	4	5	6	7	8	9
7. I am confident in my ability to adhere to professional ethics in my work with clients/patients.	**.471**	.108	.098	.141	.104	.031	.079	.081	-.007
8. I am confident in my ability to build "good working" relationships with my clients/patients.	**.552**	.148	.132	.269	.061	.027	-.022	.030	.042
9. I am confident in my ability to engage in clinical problem solving at my clinical site.	**.736**	.170	.062	.179	.153	.071	.024	.017	.064
10. I am confident in my ability to explain the purpose of each skill/intervention I do to my supervisors/preceptors.	**.736**	.170	.089	.106	.202	.113	.095	.018	.093
11. I am confident in my ability to demonstrate my professional skills/interventions to my supervisors/preceptors.	**.761**	.170	.112	.116	.195	.119	.062	.040	.123
12. I am confident in my ability to adjust skills/interventions to meet the needs of my clients/patients.	**.726**	.196	.199	.132	.153	.089	.118	.116	.034
13. I am confident in my ability to use research/scientific literature to inform my clinical skills/interventions.	**.573**	.141	.107	.015	.143	.201	.178	-.012	.112
14. I am confident in my ability to document my client/patient encounters to the standards of my doctoral level clinical practicum site.	**.639**	.102	.085	.039	.194	.230	.115	-.034	.106
15. I am confident in my ability to define clinical treatment objectives in specific terms.	**.769**	.175	.149	.055	.172	.140	.126	.036	.066
10. I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor.	.**452**	.127	.243	.180	**.446**	.103	.042	.071	.092
11. I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor.	.**513**	.077	.238	.162	**.411**	.087	.019	.010	.040
Diversity, Equity, and Inclusion Self-Efficacy									
8. I am confident in my ability to accept and implement feedback about my multicultural competency.	.110	**.517**	.149	.203	.110	.060	.077	.192	.002
9. I am confident in my ability to notice and address a microaggression I have made.	.169	**.649**	.144	.160	.113	.112	-.017	.049	-.081
10. I am confident in my ability to discuss concerns about diversity, equity, and inclusion within a doctoral program.	.171	**.650**	.171	.216	.107	.058	.032	.197	.135
11. I am confident in my ability to provide feedback to a doctoral program about issues of diversity, equity, and inclusion.	.169	**.613**	.178	.119	.103	.031	.010	.196	.017
12. I am confident in my ability to contribute to creating a safe environment for people of all identities in my program.	.149	**.549**	.164	.235	.023	.061	-.089	.137	-.026
13. I am confident in my ability to critique articles in doctoral level classes for issues of diversity, equity, and inclusion.	.139	**.686**	.143	.113	.009	.116	.055	.026	.118

	1	2	3	4	5	6	7	8	9
14. I am confident in my ability to discuss issues of diversity, equity, and inclusion in my field in a doctoral level class discussion.	.177	**.740**	.087	.190	.065	.076	.067	.073	.096
15. I am confident in my ability to identify issues of diversity, equity, and inclusion in presentations I give in doctoral level class.	.157	**.782**	.081	.157	.136	.076	.039	.027	.130
16. I am confident in my ability to critique research for issues of diversity, equity, and inclusion.	.123	**.771**	.048	.072	.083	.128	.108	-.027	.085
17. I am confident in my ability to form a research study that takes into consideration marginalized identities.	.094	**.646**	.103	.002	.067	.193	.031	.052	.037
18. I am confident in my ability to recruit participants in a way that accounts for inclusion of marginalized identities.	.206	**.549**	.127	.019	.082	.156	.058	.118	-.054
19. I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients.	**.402**	**.504**	.129	.096	.101	.093	.044	-.006	-.078
20. I am confident in my ability to discuss issues of diversity, equity, and inclusion concerns with my clients/patients.	.305	**.619**	.082	.060	.118	.027	.036	-.016	.052
21. I am confident in my ability to solve ethical problems in relation to diversity, equity, and inclusion of my clients/patients.	.291	**.577**	.094	.058	.075	.105	.057	.001	.007
22. I am confident in my ability to be aware of how my unconscious biases impact client/patient care.	.177	**.580**	.223	.078	.066	.047	.039	.041	-.055
23. I am confident in my ability to address microaggressions with my peers/cohort.	.125	**.545**	.118	.228	.070	-.053	.075	.154	-.011
24. I am confident in my ability to provide support around issues of diversity, equity, and inclusion to my peers/cohort.	.131	**.679**	.112	.178	.060	-.012	.000	.078	.003
28. I am confident in my ability to accept feedback about my multicultural competency from my doctoral advisor.	.195	**.473**	**.397**	.109	.049	.015	.089	.149	.024
Advisor Relationship Self-Efficacy									
1. I am confident in my ability to communicate my needs to my doctoral advisor.	.222	.192	**.729**	.106	.177	.070	.022	.072	.097
2. I am confident in my ability to get the resources I need from my doctoral advisor.	.073	.144	**.754**	.131	.120	.126	.103	.165	.066
3. I am confident in my ability to schedule and initiate meetings with my doctoral advisor.	.060	.120	**.738**	.148	.114	.085	-.005	.032	.078
4. I am confident in my ability to seek help from my doctoral advisor.	.165	.112	**.829**	.133	.174	.100	.031	.057	.096
5. I am confident in my ability to collaborate on research with my doctoral advisor.	.187	.099	**.644**	.177	.101	.305	.033	.093	.091
6. I am confident in my ability to establish a trusting relationship with my doctoral advisor.	.133	.134	**.825**	.172	.094	.102	.039	.145	.074

	1	2	3	4	5	6	7	8	9
7. I am confident in my ability to talk about problems with my doctoral advisor.	.141	.175	**.809**	.097	.230	.081	.021	.155	.076
8. I am confident in my ability to ask my doctoral advisor questions.	.144	.117	**.759**	.133	.233	.050	.031	.107	.137
9. I am confident in my ability to self-disclose to my doctoral advisor when necessary.	.211	.179	**.711**	.099	.234	.140	-.047	.098	.058
10. I am confident in my ability to have difficult conversations with my doctoral advisor.	.165	.197	**.664**	.086	.229	.147	.003	.097	-.008
11. I am confident in my ability to give my doctoral advisor feedback.	.095	.231	**.593**	.081	.240	.035	.066	.107	-.042
26. I am confident in my ability to seek support from my doctoral advisor following a microaggression.	.057	.278	**.506**	.164	.118	-.049	.092	**.368**	-.020
27. I am confident in my ability to provide my advisor feedback about issues of diversity, equity, and inclusion.	.074	**.419**	**.462**	.137	.117	-.017	.116	.230	.017
Peer Relationship Self-Efficacy									
1. I am confident in my ability to build relationships with peers in my doctoral program.	.127	.111	.092	**.788**	.084	.014	.060	.060	.028
2. I am confident in my ability to communicate my needs with my peers/cohort.	.104	.162	.146	**.800**	.175	.026	.046	.095	.115
3. I am confident in my ability to ask my peers/cohort for advice.	.084	.096	.104	**.845**	.131	.032	.022	.128	.107
4. I am confident in my ability to collaborate with my peers/cohort.	.178	.116	.168	**.779**	.091	-.011	.035	.095	.088
5. I am confident in my ability to seek out help from members of my doctoral program.	.165	.121	.225	**.668**	.146	.011	-.025	.148	.073
6. I am confident in my ability to seek out support from members of my doctoral program.	.185	.128	.242	**.658**	.165	.025	-.041	.066	.020
7. I am confident in my ability to support my peers/cohort.	.216	.179	.119	**.688**	.157	.015	-.022	.049	.064
8. I am confident in my ability to confront my peers/cohort about problems.	.086	.232	.159	**.393**	.128	.041	-.013	.086	-.034
9. I am confident in my ability to solve disagreements between myself and my peers/cohort.	.057	.237	.141	**.489**	.102	.045	-.004	.197	-.065
10. I am confident in my ability to provide resources/materials for peers in my doctoral program.	.156	**.319**	.193	**.374**	.072	.057	-.005	.032	.127
11. I am confident in my ability to hang out and have fun with peers in my doctoral program.	.105	.126	.025	**.685**	.023	.021	-.013	.097	-.040
12. I am confident in my ability to talk about program concerns with my peers/cohort.	.053	.195	.046	**.639**	.137	.033	.011	.013	.096
25. I am confident in my ability to be myself around members of my program.	.125	.106	.120	**.502**	.023	-.008	.042	.242	.054
9. I am confident in my ability to collaborate with other students on projects in doctoral level classes.	.300	.105	.143	**.457**	.028	.061	-.081	.050	.171

	1	2	3	4	5	6	7	8	9
Clinical Supervisor Relationship Self-Efficacy									
1. I am confident in my ability to ask for the support I need from my clinical supervisor/preceptor.	.203	.146	.358	.159	**.691**	.024	.015	.128	.097
2. I am confident in my ability to communicate my needs with my clinical supervisor/preceptor.	.237	.165	.260	.120	**.746**	.077	-.026	.065	.077
3. I am confident in my ability to tell my clinical supervisor/preceptor I do not know the answer.	.160	.066	.193	.151	**.741**	.052	.033	.037	.051
4. I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor.	**.414**	.189	.193	.141	**.541**	.165	.018	.077	.106
5. I am confident in my ability to ask for resources from my clinical supervisor/preceptor.	.226	.122	.262	.220	**.634**	.031	-.001	.052	.088
6. I am confident in my ability to discuss my clinical weaknesses with my clinical supervisor/preceptor.	.282	.126	.248	.155	**.628**	.043	-.045	-.006	.057
7. I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor.	**.382**	.177	.169	.251	**.492**	-.033	-.065	.048	.074
8. I am confident in my ability to self-disclose to my clinical supervisors/preceptor when necessary.	.281	.193	.272	.205	**.606**	.039	-.063	-.049	.056
9. I am confident in my ability to give my clinical supervisor/preceptor feedback.	.226	.151	.256	.103	**.571**	.015	.056	.100	.081
Research Writing and Design Self-Efficacy									
1. I am confident in my ability to come up with a doctoral level research idea.	.232	-.002	.180	-.030	.115	.382	.147	.008	.136
2. I am confident in my ability to form hypotheses about a research topic.	.207	.026	.172	.019	.093	.317	.240	-.003	.196
5. I am confident in my ability to recruit participants for a doctoral level research study.	.165	.119	.166	.034	.005	**.468**	.150	-.066	.016
6. I am confident in my ability to successfully submit research proposals to the IRB (Institutional Review Board).	.186	.074	.201	-.016	.017	**.525**	.213	-.038	.125
11. I am confident in my ability to write a literature review that meets doctoral level expectations.	.326	.194	.063	.031	.046	**.693**	.155	-.011	.175
12. I am confident in my ability to write a methods section that meets doctoral level expectations.	.166	.102	.154	.025	.059	**.633**	.471	-.028	.120
14. I am confident in my ability to write a discussion section that meets doctoral level expectations.	.262	.212	.121	.083	.059	**.671**	.220	.041	.059
15. I am confident in my ability to write a manuscript for publication.	.196	.109	.126	.004	.029	**.582**	.318	-.015	.075
6. I am confident in my ability to write a paper at the doctoral level.	.185	.161	.107	.041	.020	**.453**	.108	.106	**.398**
12. I am confident in my ability to format a paper correctly according to doctoral level expectations.	.086	-.051	.084	.044	.069	**.445**	.121	.098	**.349**

	1	2	3	4	5	6	7	8	9
Statistical Analysis Self-Efficacy									
3. I am confident in my ability to critique research methodology at the doctoral level.	.144	.071	.055	-.062	.053	**.352**	**.408**	-.043	.125
4. I am confident in my ability to choose an appropriate methodology for my doctoral research study.	.193	.109	.094	.028	.101	**.391**	**.494**	-.075	.083
7. I am confident in my ability to accurately use statistical programs.	.028	.029	.048	.026	-.019	.272	**.744**	-.022	.156
8. I am confident in my ability to understand doctoral level data analysis.	.081	.040	-.025	-.014	-.013	.180	**.886**	.003	.085
9. I am confident in my ability to accurately analyze quantitative data.	.117	.037	.001	.021	-.043	.149	**.905**	-.033	.040
10. I am confident in my ability to accurately analyze qualitative data.	.175	.075	.034	.012	-.068	.170	**.444**	.115	-.137
13. I am confident in my ability to write a results section that meets doctoral level expectations.	.174	.100	.120	.016	.057	**.520**	**.573**	-.010	.099
Seeking Support for DEI Self-Efficacy									
4. I am confident in my ability to receive support in a doctoral program environment if I am being discriminated against.	.027	.127	.236	.230	.040	-.005	-.027	**.744**	.071
5. I am confident in my ability to ask for help in a doctoral program environment when I experience oppression/discrimination.	.004	.183	.258	.196	.083	-.013	-.048	**.851**	.056
6. I am confident in my ability to seek out support in a doctoral program environment when I experience oppression/discrimination.	.060	.202	.261	.196	.075	-.007	-.029	**.856**	.101
7. I am confident in my ability to address issues of (racism/sexism/homophobia/etc.) in a doctoral program environment without getting nervous.	.019	**.357**	.231	.147	.010	.039	.035	**.496**	.018
Academic Self-Efficacy									
1. I am confident in my ability to earn the grades I desire in my doctoral level classes.	.189	.046	.134	.142	.058	.129	.067	.029	**.756**
2. I am confident in my ability to perform well on tests in my doctoral program.	.131	-.035	.050	.042	.144	.125	.055	.030	**.733**
3. I am confident in my ability to complete the doctoral level homework my professor assigns to me.	.190	.065	.114	.154	.062	.227	.136	.167	**.402**
4. I am confident in my ability to give a doctoral level presentation during class.	**.190**	.136	.087	**.267**	.116	.195	.030	-.010	**.315**
5. I am confident in my ability to comprehend the doctoral level readings my professors assign to me. supervisors/preceptor when necessary.	**.254**	.157	.077	.169	.030	**.223**	.198	.034	**.297**

	1	2	3	4	5	6	7	8	9
7. I am confident in my ability to turn in doctoral level assignments on time.	**.183**	.049	.125	**.204**	.052	.129	.015	.139	**.303**
8. I am confident in my ability to understand a syllabus for doctoral level classes.	.088	-.006	.109	**.140**	.043	**.130**	.031	-.003	**.245**
10. I am confident in my ability to take useful notes in a doctoral level lecture.	.230	.130	.236	.126	.098	.074	.118	.082	**.401**
11. I am confident in my ability to participate in class discussions at the doctoral level.	.208	.101	.126	.270	.057	.174	.009	.074	.208

76-Item SEADS. In order to further investigate a possible factor structure solution for the SEADS, items that cross-loaded on two or more factors were deleted, along with items with a restricted range, and items with factor loadings below .40 (Tabachnick & Fidell, 2007; Osbourne & Costello, 2004). Thirty-one items were dropped from the original 107-Item SEADS (see Appendix D and E). All 12 items from the Academic Self-Efficacy subscale were dropped. These items loaded on a ninth factor, which is not supported by the scree plot or eigenvalues. This was also in line with results from the expert review, as many reviewers expressed concern that the academic items were "too elementary."

More specifically, five items were dropped due to poor item loadings (*"4. I am confident in my ability to give a doctoral level presentation during class"* [.315], *"5. I am confident in my ability to comprehend the doctoral level readings my professors assign to me"* [.297], *"6. I am confident in my ability to turn in doctoral level assignments on time"* [.303], *"8. I am confident in my ability to understand a syllabus for doctoral level classes"* [.245], *"11. I am confident in my ability to participate in class discussions at the doctoral level"* [.208]. Four items were dropped due to not loading within the factor structure and lack of range (*"1. I am confident in my ability to earn the grades I desire in my doctoral level classes," "2. I am confident in my ability to perform well on tests in my doctoral program," "3. I am confident in my ability to complete*

the doctoral level homework my professor assigns to me," and *"10. I am confident in my ability to take useful notes in a doctoral level lecture."*).

Items seven and twelve were dropped due to cross-loading on the Research Self-Efficacy factor and similarity to items on that subscale (*"7. I am confident in my ability to write a paper at the doctoral level"* and *"12. I am confident in my ability to format a paper correctly according to doctoral level expectations"*). Item nine was dropped due to loading fully on the Peer Relationship Self-Efficacy subscale (*"9. I am confident in my ability to collaborate with other students on projects in doctoral level classes"*). While the item had good item loadings, it was poorly worded and determined to measure working with peers on a specific task, not skills about building and maintaining relationships.

Two peer relationship items were dropped due to poor item loadings (*"8. I am confident in my ability to confront my peers/cohort about problems"* [.393] and *"10. I am confident in my ability to provide resources/materials for peers in my doctoral program"* [.374]). Four items from the Clinical Supervisor Relationship Self-Efficacy subscale cross-loaded onto the Clinical Self-Efficacy subscale (*"4. I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor," "7. I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor," "10. I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor,"* and *"11. I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor"*). These items had good item loadings (.411 - .541) and will be considered for rewording upon the future confirmatory study.

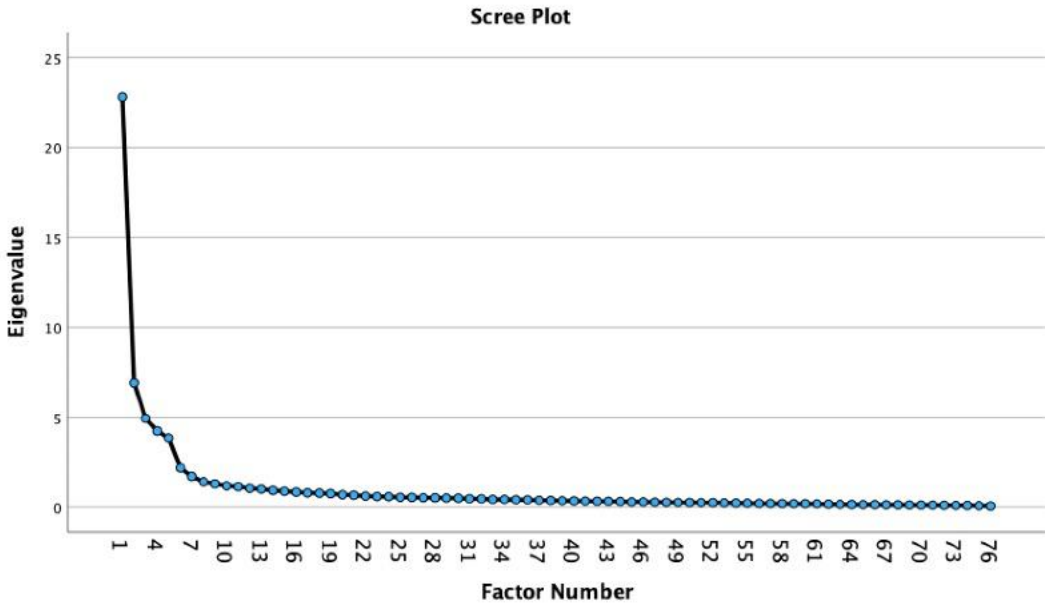
DEI Self-Efficacy items loaded across multiple factors when evaluating the 107-item scale. Several items represented DEI behaviors in relation to the culture of a doctoral program

instead of students' belief in their ability to accomplish a DEI related task. For this reason, 12 items that represented program culture were dropped (items one through seven and 27 through 31). Item nineteen (*"19. I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients"* [.504]) was dropped due to cross loading onto Clinical Self-Efficacy subscale (.402) and will be considered for re-wording upon the future confirmatory study. Two items were retained that fully loaded onto other factors due to good item loadings. Item 25 (*"25. I am confident in my ability to be myself around members of my program"* [.539]) loaded onto Peer Relationship Self-Efficacy and appeared to capture the relational aspect of peer relationships, not any DEI specific tasks. Item 26 (*"26. I am confident in my ability to seek support from my doctoral advisor following a microaggression"* [.532]) fully loaded onto Advisor Relationship Self-Efficacy and will be considered for re-wording upon the future confirmatory study.

As with the 107-Item version, the factor structure of the 76-Item SEADS was explored with exploratory factor analysis utilizing Maximum Likelihood with a Varimax rotation. Seven factors emerged, as evidenced by eigenvalues exceeding one and the scree plot (See Figure 2). Six factors were forced to retain more items and combine Research Writing and Design Self-Efficacy and Statistical Analysis Self-Efficacy subscales into one scale (see Table 5). This factor structure is still preliminary and will need to be further evaluated by a confirmatory factor analysis.

Figure 2

Scree Plot with Revised 76 Items, utilizing Maximum Likelihood Factoring with Varimax Rotation



More specifically, the 15 items on the first factor, Clinical Self-Efficacy, explored doctoral students' belief in their ability to complete basic clinical tasks in their applied field. All items were retained from the original subscale. This factor accounted for 10.9% of the variance of the total scale and factor loadings range from .452 - .760.

The 16 items on the second factor, DEI Self-Efficacy, measured doctoral students' belief in their ability to address issues of DEI in their own behaviors, the environments they are in, and within each of the other domains of doctoral student self-efficacy. This factor accounted for 10.8% of the variance of the total scale with factor loadings ranging from .533 - .788.

The 12 items on the third factor, Advisor Relationship Self-Efficacy, measured doctoral students' belief in their ability to communicate with, navigate through, and maintain a relationship with their advisor. Eleven items came from the items originally written for the Advisor Relationship Self-Efficacy subscale and one item was originally written for the DEI Self-Efficacy subscale (*"26. I am confident in my ability to seek support from my doctoral advisor following a microaggression"*). This factor accounted for 10.6% of the variance of the total scale and factor loadings range from .601 - .834.

The 15 items on the fourth factor, Research Self-Efficacy, explored doctoral students' belief in their ability to design and implement a research study, to write a research paper, and to analyze data. All original items were retained from the original subscale. This factor accounted for 9.3% of the variance of the total scale with factor loadings ranging from .422 - .790.

The 11 items on the fifth factor, Peer Relationship Self-Efficacy, evaluated doctoral students' belief in their ability to build, navigate, and maintain relationships with fellow peers in their programs. Ten items come from the items originally written for the Peer Relationship Self-Efficacy subscale and one item was originally written for the DEI Self-Efficacy subscale (*"25. I am confident in my ability to be myself around members of my program"*). This factor accounted for 8.9% of the variance of the total scale with factor loadings ranging from .493 - .843.

The seven items on the sixth factor, Clinical Supervisor Relationship Self-Efficacy, explored doctoral students' belief in their ability to communicate with, seek assistance from, and maintain a relationship with their clinical supervisor/preceptor. Only seven of the original 11 items written for this subscale were retained. This factor accounted for 5.1% of the variance of the total scale with factor loadings ranging from .583 - .746.

While factors one, two, and four in the EFA supported the original hypothesis and factor structure of the SEADS, the splitting of the Relationship Self-Efficacy subscale into three separate factors was not expected and consequently does not support the hypothesis.

For the final iteration of the 76-Item SEADS, a six-factor structure was forced. If the items are not forced into six factors, seven factors emerge and explain 56.385 percent variance (compared to 55.699 percent). However, the scree plot supports six factors (DeVellis, 2017). Additionally, Research Self-Efficacy splits into three separate factors (Statistical Analysis Self-Efficacy, Research Writing and Design Self-Efficacy, and Research Methodology Self-Efficacy),

with multiple items cross-loading between the three factors. By forcing six factors, Statistical Analysis, Research Writing and Design, and Research Methodology merge into one factor and the factor loadings improved (ranging from .422 - .790) with no items cross-loading to other factors. The forced six-factor model also increases the number of items in the subscale (fifteen items vs. seven, five and three items respectively) which better fits the format/size of the other subscales. Therefore, the cleanest version of the SEADS is the 76-item, six-factor iteration (See Table 6). This structure will need to be further confirmed with a confirmatory factor analysis.

Table 5

107-Item vs. 76-Item SEADS Maximum Likelihood Factoring with Varimax Rotation

			Original 107-Item SEADS		Revised 76-Item SEADS	
	M	SD	Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
Clinical Self-Efficacy						
1. I am confident in my ability to master the skills needed to be successful in my field's doctoral clinical practicum.	4.20	0.86	.55	1	.57	1
2. I am confident in my ability to achieve my clinical goals during my field's doctoral clinical practicum.	4.31	0.75	.65	1	.65	1
3. I am confident in my ability to show empathy towards my clients/patients.	4.81	0.46	.50	1	.50	1
4. I am confident in my ability to successfully implement clinical interventions according to my field's expectations.	4.19	0.85	.77	1	.75	1
5. I am confident in my ability to accurately assess a client/patient's problems.	4.14	0.83	.72	1	.71	1
6. I am confident in my ability to receive and integrate feedback about my doctoral level clinical work.	4.52	0.63	.58	1	.58	1
7. I am confident in my ability to adhere to professional ethics in my work with clients/patients.	4.69	0.56	.47	1	.45	1
8. I am confident in my ability to build "good working" relationships with my clients/patients.	4.69	0.59	.55	1	.56	1
9. I am confident in my ability to engage in clinical problem solving at my clinical site.	4.30	0.78	.74	1	.75	1

			Original 107-Item SEADS		Revised 76-Item SEADS	
	M	SD	Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
10. I am confident in my ability to explain the purpose of each skill/intervention I do to my supervisors/preceptors.	4.09	0.89	.74	1	.73	1
11. I am confident in my ability to demonstrate my professional skills/interventions to my supervisors/preceptors.	4.06	0.93	.76	1	.76	1
12. I am confident in my ability to adjust skills/interventions to meet the needs of my clients/patients.	4.17	0.85	.73	1	.72	1
13. I am confident in my ability to use research/scientific literature to inform my clinical skills/interventions.	4.14	0.86	.57	1	.57	1
14. I am confident in my ability to document my client/patient encounters to the standards of my doctoral level clinical practicum site.	4.21	0.90	.64	1	.63	1
15. I am confident in my ability to define clinical treatment objectives in specific terms.	4.02	.097	.77	1	.75	1
Diversity, Equity, and Inclusion Self-Efficacy						
1. I am confident in my ability to express my identities safely within a doctoral program environment.	4.13	1.02	.64	12	--	--
2. I am confident in my ability to receive the same treatment as other members in a doctoral program environment.	4.13	1.03	.55	12	--	--
3. I am confident in my ability to openly share about my culture within a doctoral program environment.	4.11	1.04	.57	12	--	--
4. I am confident in my ability to receive support in a doctoral program environment if I am being discriminated against.	3.69	1.20	.74	8	--	--
5. I am confident in my ability to ask for help in a doctoral program environment when I experience oppression/discrimination.	3.64	1.21	.85	8	--	--
6. I am confident in my ability to seek out support in a doctoral program environment when I experience oppression/discrimination.	3.70	1.21	.86	8	--	--
7. I am confident in my ability to address issues of (racism/sexism/homophobia/etc.) in a doctoral program environment without getting nervous.	3.24	1.29	.36	2	--	--
8. I am confident in my ability to accept and implement feedback about my multicultural competency.	4.33	0.78	.52	2	.53	2
9. I am confident in my ability to notice and address a microaggression I have made.	4.01	0.83	.65	2	.63	2

			Original 107-Item SEADS		Revised 76-Item SEADS	
	M	SD	Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
10. I am confident in my ability to discuss concerns about diversity, equity, and inclusion within a doctoral program.	4.19	0.96	.65	2	.67	2
11. I am confident in my ability to provide feedback to a doctoral program about issues of diversity, equity, and inclusion.	3.89	1.06	.61	2	.63	2
12. I am confident in my ability to contribute to creating a safe environment for people of all identities in my program.	4.49	0.68	.55	2	.56	2
13. I am confident in my ability to critique articles in doctoral level classes for issues of diversity, equity, and inclusion.	4.15	0.91	.69	2	.71	2
14. I am confident in my ability to discuss issues of diversity, equity, and inclusion in my field in a doctoral level class discussion.	4.21	0.91	.74	2	.75	2
15. I am confident in my ability to identify issues of diversity, equity, and inclusion in presentations I give in doctoral level class.	4.13	0.93	.78	2	.79	2
16. I am confident in my ability to critique research for issues of diversity, equity, and inclusion.	4.14	0.88	.77	2	.77	2
17. I am confident in my ability to form a research study that takes into consideration marginalized identities.	4.04	0.95	.65	2	.64	2
18. I am confident in my ability to recruit participants in a way that accounts for inclusion of marginalized identities.	3.76	1.02	.55	2	.53	2
19. I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients.	4.06	0.87	.50	2	--	--
20. I am confident in my ability to discuss issues of diversity, equity, and inclusion concerns with my clients/patients.	3.98	0.91	.62	2	.63	2
21. I am confident in my ability to solve ethical problems in relation to diversity, equity, and inclusion of my clients/patients.	3.92	0.90	.58	2	.59	2
22. I am confident in my ability to be aware of how my unconscious biases impact client/patient care.	4.24	0.69	.58	2	.54	2
23. I am confident in my ability to address microaggressions with my peers/cohort.	3.70	1.01	.55	2	.54	2
24. I am confident in my ability to provide support around issues of diversity, equity, and inclusion to my peers/cohort.	4.20	0.82	.68	2	.69	2
25. I am confident in my ability to be myself around members of my program.	3.96	1.11	.50	4	.54	5
26. I am confident in my ability to seek support from my doctoral advisor following a microaggression.	3.62	1.21	.51	3	.53	3

	M	SD	Original 107-Item SEADS		Revised 76-Item SEADS	
			Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
27. I am confident in my ability to provide my advisor feedback about issues of diversity, equity, and inclusion.	3.55	1.19	.46	3	--	--
28. I am confident in my ability to accept feedback about my multicultural competency from my doctoral advisor.	4.30	0.86	.47	2	--	--
29. I am confident in my ability to explore client/patient concerns of diversity, equity, and inclusion with my clinical supervisor/preceptor.	4.38	0.73	.59	10	--	--
30. I am confident in my ability to ask for resources from my clinical supervisor/preceptor on behalf of my marginalized clients/patients.	4.47	0.71	.70	10	--	--
31. I am confident in my ability to explore my unconscious biases with my clinical supervisor/preceptor.	4.34	0.83	.59	10	--	--
Advisor Relationship Self-Efficacy						
1. I am confident in my ability to communicate my needs to my doctoral advisor.	3.89	1.08	.73	3	.74	3
2. I am confident in my ability to get the resources I need from my doctoral advisor.	3.99	1.06	.75	3	.77	3
3. I am confident in my ability to schedule and initiate meetings with my doctoral advisor.	4.41	0.88	.74	3	.73	3
4. I am confident in my ability to seek help from my doctoral advisor.	4.19	1.02	.83	3	.83	3
5. I am confident in my ability to collaborate on research with my doctoral advisor.	4.03	1.06	.64	3	.66	3
6. I am confident in my ability to establish a trusting relationship with my doctoral advisor.	4.22	1.04	.83	3	.83	3
7. I am confident in my ability to talk about problems with my doctoral advisor.	3.92	1.14	.81	3	.82	3
8. I am confident in my ability to ask my doctoral advisor questions.	4.36	0.90	.76	3	.77	3
9. I am confident in my ability to self-disclose to my doctoral advisor when necessary.	3.89	1.15	.71	3	.72	3
10. I am confident in my ability to have difficult conversations with my doctoral advisor.	3.58	1.19	.66	3	.68	3
11. I am confident in my ability to give my doctoral advisor feedback.	3.26	1.26	.59	3	.60	3
Research Self-Efficacy						
1. I am confident in my ability to come up with a doctoral level research idea.	3.68	1.05	.69	11	.48	4
2. I am confident in my ability to form hypotheses about a research topic.	3.87	0.98	.67	11	.52	4
3. I am confident in my ability to critique research methodology at the doctoral level.	3.38	1.01	.41	7	.63	4

			Original 107-Item SEADS		Revised 76-Item SEADS	
	M	SD	Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
4. I am confident in my ability to choose an appropriate methodology for my doctoral research study.	3.33	1.04	.49	7	.70	4
5. I am confident in my ability to recruit participants for a doctoral level research study.	3.47	1.04	.47	6	.44	4
6. I am confident in my ability to successfully submit research proposals to the IRB (Institutional Review Board).	3.37	1.22	.53	6	.53	4
7. I am confident in my ability to accurately use statistical programs.	2.75	1.18	.74	7	.75	4
8. I am confident in my ability to understand doctoral level data analysis.	3.05	1.10	.89	7	.79	4
9. I am confident in my ability to accurately analyze quantitative data.	3.11	1.12	.91	7	.79	4
10. I am confident in my ability to accurately analyze qualitative data.	3.12	1.09	.44	7	.42	4
11. I am confident in my ability to write a literature review that meets doctoral level expectations.	3.83	1.04	.69	6	.56	4
12. I am confident in my ability to write a methods section that meets doctoral level expectations.	3.62	1.05	.63	6	.79	4
13. I am confident in my ability to write a results section that meets doctoral level expectations.	3.44	1.13	.57	7	.78	4
14. I am confident in my ability to write a discussion section that meets doctoral level expectations.	3.64	1.02	.67	6	.58	4
15. I am confident in my ability to write a manuscript for publication.	2.97	1.19	.58	6	.61	4
Peer Relationship Self-Efficacy						
1. I am confident in my ability to build relationships with peers in my doctoral program.	4.44	0.80	.79	4	.79	5
2. I am confident in my ability to communicate my needs with my peers/cohort.	4.21	0.93	.80	4	.80	5
3. I am confident in my ability to ask my peers/cohort for advice.	4.40	0.90	.85	4	.84	5
4. I am confident in my ability to collaborate with my peers/cohort.	4.51	0.72	.78	4	.78	5
5. I am confident in my ability to seek out help from members of my doctoral program.	4.33	0.90	.67	4	.72	5
6. I am confident in my ability to seek out support from members of my doctoral program.	4.28	0.94	.66	4	.71	5
7. I am confident in my ability to support my peers/cohort.	4.54	0.68	.69	4	.70	5

			Original 107-Item SEADS		Revised 76-Item SEADS	
	M	SD	Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
8. I am confident in my ability to confront my peers/cohort about problems.	3.49	1.12	.39	4	--	--
9. I am confident in my ability to solve disagreements between myself and my peers/cohort.	3.71	1.06	.49	4	.49	5
10. I am confident in my ability to provide resources/materials for peers in my doctoral program.	4.39	0.77	.37	4	--	--
11. I am confident in my ability to hang out and have fun with peers in my doctoral program.	4.25	1.03	.69	4	.69	5
12. I am confident in my ability to talk about program concerns with my peers/cohort.	4.45	0.82	.64	4	.64	5
Clinical Supervisor Relationship Self-Efficacy						
1. I am confident in my ability to ask for the support I need from my clinical supervisor/preceptor.	4.13	0.93	.69	5	.69	6
2. I am confident in my ability to communicate my needs with my clinical supervisor/preceptor.	4.11	0.97	.75	5	.75	6
3. I am confident in my ability to tell my clinical supervisor/preceptor I do not know the answer.	4.21	0.95	.74	5	.71	6
4. I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor.	4.21	.091	.54	5	--	--
5. I am confident in my ability to ask for resources from my clinical supervisor/preceptor.	4.40	0.77	.63	5	.58	6
6. I am confident in my ability to discuss my clinical weaknesses with my clinical supervisor/preceptor.	4.26	0.83	.63	5	.58	6
7. I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor.	4.17	0.92	.49	5	--	--
8. I am confident in my ability to self-disclose to my clinical supervisors/preceptor when necessary.	4.03	1.00	.61	5	.61	6
9. I am confident in my ability to give my clinical supervisor/preceptor feedback.	3.53	1.14	.57	5	.60	6
10. I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor.	4.32	0.84	.45	1	--	--
11. I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor.	4.32	0.83	.51	1	--	--
Academic Self-Efficacy						
1. I am confident in my ability to earn the grades I desire in my doctoral level classes.	4.41	0.63	.76	9	--	--
2. I am confident in my ability to perform well on tests in my doctoral program.	4.12	0.78	.73	9	--	--

	M	SD	Original 107-Item SEADS		Revised 76-Item SEADS	
			Item Loading	Factor on which Item Loaded	Item Loading	Factor on which Item Loaded
3. I am confident in my ability to complete the doctoral level homework my professor assigns to me.	4.53	0.66	.40	9	--	--
4. I am confident in my ability to give a doctoral level presentation during class.	4.15	0.85	.32	9	--	--
5. I am confident in my ability to comprehend the doctoral level readings my professors assign to me.	4.11	0.78	.30	9	--	--
6. I am confident in my ability to turn in doctoral level assignments on time.	4.60	0.69	.30	9	--	--
7. I am confident in my ability to write a paper at the doctoral level.	4.09	0.87	.40	9	--	--
8. I am confident in my ability to understand a syllabus for doctoral level classes.	4.88	0.35	.30	17	--	--
9. I am confident in my ability to collaborate with other students on projects in doctoral level classes.	4.63	0.58	.46	4	--	--
10. I am confident in my ability to take useful notes in a doctoral level lecture.	4.37	0.80	.40	9	--	--
11. I am confident in my ability to participate in class discussions at the doctoral level.	4.26	0.88	.28	11	--	--
12. I am confident in my ability to format a paper correctly according to doctoral level expectations.	4.29	0.87	.45	6	--	--

Table 6

76-Item SEADS Rotated Factor Matrix

	1	2	3	4	5	6
Clinical Self-Efficacy						
1. I am confident in my ability to master the skills needed to be successful in my field's doctoral clinical practicum.	**.565**	.182	.108	.293	.100	.101
2. I am confident in my ability to achieve my clinical goals during my field's doctoral clinical practicum.	**.649**	.156	.135	.165	.199	.110
3. I am confident in my ability to show empathy towards my clients/patients.	**.500**	.166	.131	.092	.230	.045
4. I am confident in my ability to successfully implement clinical interventions according to my field's expectations.	**.745**	.193	.099	.126	.104	.082
5. I am confident in my ability to accurately assess a client/patient's problems.	**.707**	.240	.101	.184	.063	.042
6. I am confident in my ability to receive and integrate feedback about my doctoral level clinical work.	**.582**	.222	.172	.173	.095	.130
7. I am confident in my ability to adhere to professional ethics in my work with clients/patients.	**.452**	.114	.113	.090	.176	.094
8. I am confident in my ability to build "good working" relationships with my clients/patients.	**.556**	.146	.148	.040	.279	.040

	1	2	3	4	5	6
9. I am confident in my ability to engage in clinical problem solving at my clinical site.	**.746**	.177	.066	.118	.177	.150
10. I am confident in my ability to explain the purpose of each skill/intervention I do to my supervisors/preceptors.	**.730**	.183	.082	.204	.098	.202
11. I am confident in my ability to demonstrate my professional skills/interventions to my supervisors/preceptors.	**.760**	.196	.115	.180	.109	.189
12. I am confident in my ability to adjust skills/interventions to meet the needs of my clients/patients.	**.719**	.196	.130	.215	.162	.074
13. I am confident in my ability to use research/scientific literature to inform my clinical skills/interventions.	**.571**	.147	.106	.322	.013	.156
14. I am confident in my ability to document my client/patient encounters to the standards of my doctoral level clinical practicum site.	**.633**	.121	.071	.242	.046	.175
15. I am confident in my ability to define clinical treatment objectives in specific terms.	**.746**	.187	.136	.216	.072	.151
Diversity, Equity, and Inclusion Self-Efficacy						
8. I am confident in my ability to accept and implement feedback about my multicultural competency.	.103	**.533**	.174	.101	.233	.092
9. I am confident in my ability to notice and address a microaggression I have made.	.167	**.632**	.142	.043	.143	.080
10. I am confident in my ability to discuss concerns about diversity, equity, and inclusion within a doctoral program.	.170	**.666**	.196	.089	.254	.086
11. I am confident in my ability to provide feedback to a doctoral program about issues of diversity, equity, and inclusion.	.163	**.631**	.212	.035	.164	.088
12. I am confident in my ability to contribute to creating a safe environment for people of all identities in my program.	.150	**.563**	.195	-.045	.256	.005
13. I am confident in my ability to critique articles in doctoral level classes for issues of diversity, equity, and inclusion.	.128	**.709**	.121	.137	.117	.014
14. I am confident in my ability to discuss issues of diversity, equity, and inclusion in my field in a doctoral level class discussion.	.164	**.752**	.080	.119	.208	.050
15. I am confident in my ability to identify issues of diversity, equity, and inclusion in presentations I give in doctoral level class.	.152	**.788**	.074	.107	.157	.115
16. I am confident in my ability to critique research for issues of diversity, equity, and inclusion.	.106	**.771**	.019	.201	.055	.079
17. I am confident in my ability to form a research study that takes into consideration marginalized identities.	.104	**.637**	.110	.178	-.030	.082
18. I am confident in my ability to recruit participants in a way that accounts for inclusion of marginalized identities.	.199	**.534**	.147	.160	.004	.102
20. I am confident in my ability to discuss issues of diversity, equity, and inclusion concerns with my clients/patients.	.286	**.629**	.074	.074	.066	.151
21. I am confident in my ability to solve ethical problems in relation to diversity, equity, and inclusion of my clients/patients.	.275	**.589**	.092	.133	.060	.112
22. I am confident in my ability to be aware of how my unconscious biases impact client/patient care.	.160	**.543**	.216	.053	.090	.010
23. I am confident in my ability to address microaggressions with my peers/cohort.	.113	**.542**	.136	.023	.263	.072
24. I am confident in my ability to provide support around issues of diversity, equity, and inclusion to my peers/cohort.	.120	**.686**	.122	-.002	.199	.047
Advisor Relationship Self-Efficacy						
1. I am confident in my ability to communicate my needs to my doctoral advisor.	.216	.208	**.741**	.100	.134	.168
2. I am confident in my ability to get the resources I need from my doctoral advisor.	.064	.157	**.773**	.170	.173	.081
3. I am confident in my ability to schedule and initiate meetings with my doctoral advisor.	.082	.111	**.730**	.090	.156	.074
4. I am confident in my ability to seek help from my doctoral advisor.	.173	.122	**.825**	.134	.160	.154

	1	2	3	4	5	6
5. I am confident in my ability to collaborate on research with my doctoral advisor.	.212	.111	**.663**	.249	.174	.086
6. I am confident in my ability to establish a trusting relationship with my doctoral advisor.	.135	.149	**.834**	.115	.196	.062
7. I am confident in my ability to talk about problems with my doctoral advisor.	.127	.200	**.820**	.107	.118	.223
8. I am confident in my ability to ask my doctoral advisor questions.	.149	.127	**.766**	.121	.173	.204
9. I am confident in my ability to self-disclose to my doctoral advisor when necessary.	.209	.213	**.719**	.084	.105	.241
10. I am confident in my ability to have difficult conversations with my doctoral advisor.	.160	.237	**.676**	.124	.090	.264
11. I am confident in my ability to give my doctoral advisor feedback.	.065	.261	**.601**	.075	.113	.272
26. I am confident in my ability to seek support from my doctoral advisor following a microaggression.	.033	.313	**.532**	.035	.216	.117
Research Self-Efficacy						
1. I am confident in my ability to come up with a doctoral level research idea.	.280	-.004	.227	**.480**	-.043	.123
2. I am confident in my ability to form hypotheses about a research topic.	.242	.024	.211	**.517**	.019	.114
3. I am confident in my ability to critique research methodology at the doctoral level.	.132	.072	.045	**.632**	-.072	.088
4. I am confident in my ability to choose an appropriate methodology for my doctoral research study.	.170	.097	.077	**.704**	.022	.113
5. I am confident in my ability to recruit participants for a doctoral level research study.	.190	.104	.182	**.439**	.006	.005
6. I am confident in my ability to successfully submit research proposals to the IRB (Institutional Review Board).	.212	.066	.209	**.533**	-.025	.019
7. I am confident in my ability to accurately use statistical programs.	-.030	.022	.002	**.750**	.066	-.008
8. I am confident in my ability to understand doctoral level data analysis.	-.004	.031	-.075	**.787**	.038	-.013
9. I am confident in my ability to accurately analyze quantitative data.	.027	.020	-.051	**.790**	.063	-.048
10. I am confident in my ability to accurately analyze qualitative data.	.109	.076	.005	**.422**	.026	-.068
11. I am confident in my ability to write a literature review that meets doctoral level expectations.	.357	.216	.094	**.556**	.022	.023
12. I am confident in my ability to write a methods section that meets doctoral level expectations.	.161	.115	.149	**.785**	.028	.052
13. I am confident in my ability to write a results section that meets doctoral level expectations.	.140	.105	.108	**.784**	.033	.049
14. I am confident in my ability to write a discussion section that meets doctoral level expectations.	.278	.241	.148	**.581**	.079	.040
15. I am confident in my ability to write a manuscript for publication.	.201	.122	.136	**.613**	.012	.023
Peer Relationship Self-Efficacy						
1. I am confident in my ability to build relationships with peers in my doctoral program.	.127	.122	.091	.038	**.787**	.070
2. I am confident in my ability to communicate my needs with my peers/cohort.	.106	.176	.148	.056	**.798**	.171
3. I am confident in my ability to ask my peers/cohort for advice.	.088	.112	.103	.030	**.843**	.118
4. I am confident in my ability to collaborate with my peers/cohort.	.172	.139	.170	.036	**.781**	.088
5. I am confident in my ability to seek out help from members of my doctoral program.	.178	.136	.251	-.015	**.722**	.148
6. I am confident in my ability to seek out support from members of my doctoral program.	.198	.136	.260	-.027	**.707**	.154

	1	2	3	4	5	6
7. I am confident in my ability to support my peers/cohort.	.223	.192	.130	.016	**.704**	.140
9. I am confident in my ability to solve disagreements between myself and my peers/cohort.	.059	.260	.182	.029	**.493**	.107
11. I am confident in my ability to hang out and have fun with peers in my doctoral program.	.105	.128	.031	-.018	**.685**	-.022
12. I am confident in my ability to talk about program concerns with my peers/cohort.	.060	.187	.050	.054	**.641**	.110
25. I am confident in my ability to be myself around members of my program.	.130	.143	.151	.023	**.539**	.006
Clinical Supervisor Relationship Self-Efficacy						
1. I am confident in my ability to ask for the support I need from my clinical supervisor/preceptor.	.201	.177	.371	.032	.178	**.693**
2. I am confident in my ability to communicate my needs with my clinical supervisor/preceptor.	.249	.187	.285	.042	.141	**.746**
3. I am confident in my ability to tell my clinical supervisor/preceptor I do not know the answer.	.180	.071	.212	.090	.166	**.711**
5. I am confident in my ability to ask for resources from my clinical supervisor/preceptor.	.246	.126	.288	.048	.269	**.584**
6. I am confident in my ability to discuss my clinical weaknesses with my clinical supervisor/preceptor.	.307	.133	.278	.043	.169	**.583**
8. I am confident in my ability to self-disclose to my clinical supervisors/preceptor when necessary.	.287	.214	.269	.004	.193	**.608**
9. I am confident in my ability to give my clinical supervisor/preceptor feedback.	.221	.186	.283	.063	.134	**.596**

Item loadings (Hypothesis Two)

It was hypothesized that individual item loadings would be >.40 for items on each factor of the SEADS, which is a recognized and acceptable item loading (Osbourne & Costello, 2004).

76-Item SEADS. In the new 76 item six-factor structure version of the SEADS, all items loaded above .40. Items on the 76-Item SEADS demonstrated moderate to strong loadings between .422 ("*10. I am confident in my ability to accurately analyze qualitative data"*) to .843 ("*3. I am confident in my ability to ask my peers/cohort for advice;"* see Table 6).

Total Variance Explained (Hypothesis 3).

107-Item SEADS. It was predicted the 107-Item SEADS would demonstrate an orthogonal factor structure that accounts for over 50% of the total variance. The first iteration of Maximum Likelihood with Varimax rotation, with all 107 items, yielded eigenvalues ranging from 30.412 (accounting for 9.342 percent of variance) to 2.032 (accounting for 3.378 percent of variance, See

Table 7). The 107-item, eight-factor iteration accounted for 50.251 percent of the variance explained.

Table 7

107-Item SEADS Eigenvalues and Percent Variance Explained for Rotated Factor Structure

Total Variance Explained for 107-Item SEADS	Eigenvalues	Percent variance explained
Factor One	30.412	9.342
Factor Two	8.142	8.971
Factor Three	5.368	8.290
Factor Four	5.057	7.281
Factor Five	4.658	4.955
Factor Six	2.947	4.269
Factor Seven	2.514	3.766
Factor Eight	2.392	3.378
Total		50.251

76-Item SEADS. The second exploratory factor analysis using Maximum Likelihood with Varimax rotation included 76 of the original items and loaded on six factors (see Table 8). The eigenvalues ranged from 22.792 (accounting for 10.916 percent of variance) to 2.177 (accounting for 5.125 percent of variance). The 76-item six-factor structure accounted for 55.699 percent of the variance explained.

Table 8

76-Item SEADS Eigenvalues and Percent Variance Explained for Rotated Factor Structure

Total Variance Explained for 76-item SEADS	Eigenvalues	Percent variance explained
Factor One	22.792	10.916
Factor Two	6.899	10.800
Factor Three	4.935	10.569
Factor Four	4.234	9.312
Factor Five	3.843	8.978

Factor Six	2.177	5.125
Total		55.699

In brief, the 107-item, eight-factor structure accounted for 50.251 percent of the total variance explained. The 76-item, six-factor structure accounted for 55.699 percent of the total variance explained, which is an improvement on the first iteration and above the originally desired 50 percent total variance explained, which is considered acceptable (Beavers et al., 2013).

Reliability Analysis

Internal Consistency (Hypothesis Four)

Cronbach's coefficient alpha (1951) is the most common measure of internal consistency. This measure provides evidence that items within subscales are intercorrelated and are measuring the same construct (DeVellis, 2017). In the current study, good internal consistency would indicate the subscale items are correlated and internally measure the six distinct domains of HPT doctoral student self-efficacy (clinical skills, DEI, advisor relationship, peer relationship, research skills, and clinical supervisor relationship).

Alpha levels below .60 are unacceptable; between .60 - .65 are undesirable; between .65 - .70 are minimally acceptable; between .70 - .80 are respectable; between .80 - .90 are very good; and above .90 are excellent and one can consider shortening the scale (DeVellis, 1991, p. 85). Cronbach's alpha levels above .80 indicate high levels of internal consistency (DeVellis, 2017).

107-Item SEADS. It was initially hypothesized that Cronbach's alpha for the five orthogonal subscales of the SEADS would be .80 or higher. When analyzed as an eight-factor structure (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Peer Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy, Research Writing and Design Self-Efficacy, Statistical Analysis Self-Efficacy, Seeking Support for DEI Self-Efficacy, and Academic Self-Efficacy), actual alpha levels ranged from .788 to .952 (See Table 9).

Table 9

Cronbach's Alpha for Original 107-Item SEADS

SEADS with Associated Items	Cronbach's α for 107-Item SEADS
SEADS Total Scale	.974
Clinical Self-Efficacy	.941
DEI Self-Efficacy	.942
Advisor Relationship Self-Efficacy	.952
Peer Relationship Self-Efficacy	.926
Clinical Supervisor Relationship SE	.938
Research Writing and Design SE	.874
Statistical Analysis Self-Efficacy	.882
Seeking Support for DEI SE	.936
Academic Self-Efficacy	.788

Note. α = Cronbach's Alpha

76-Item SEADS. The revised, six-factor structure demonstrated alpha levels between .916 and .952, which demonstrates strong internal consistency for the 76-item, six-factor structure of the SEADS (See Table 10).

Table 10

Cronbach's Alpha for Revised, 76-Item SEADS

SEADS with Associated Items	Cronbach's α revised, 76-Item SEADS
SEADS Total Scale	.966
Clinical Self-Efficacy	.941
DEI Self-Efficacy	.939
Advisor Relationship Self-Efficacy	.952
Research Self-Efficacy	.923
Peer Relationship Self-Efficacy	.928
Clinical Supervisor Relationship SE	.916

Note. α = Cronbach's Alpha

Validity Analyses

Construct Validity (Hypothesis Five)

HPT doctoral student self-efficacy should increase over time as students acquire more knowledge and mastery experiences in successfully completing graduate school skills, which has the most influence on self-efficacy (Bandura,1997). It was predicted the subscales of the SEADS would demonstrate strong construct validity, as evidenced by a significant increase in mean self-efficacy over time (e.g., years in the program). To assess construct validity, one-way ANOVAs and independent t-tests were run. There was a significant effect of year in school on Clinical Self-Efficacy and Research Self-Efficacy means over time. Post hoc comparisons using the Tukey HSD indicated the mean Clinical Self-Efficacy scores were significantly different between first-year and third-year students ([M = 4.15, SD = 0.68]; [M = 4.43, SD = 0.47]), first- and fourth-year students ([M = 4.15, SD = 0.68]; [M = 4.45, SD = 0.50]), first year and sixth year and above students ([M = 4.15, SD = 0.68], [M = 4.70, SD = 0.47]), second year and third-year students ([M = 4.08, SD = 0.59], [M = 4.43, SD = 0.47]), second and fourth-year students ([M = 4.08, SD = 0.59]; [M = 4.45, SD = 0.50]), second and sixth year and above students ([M = 4.08, SD = 0.59]; [M = 4.70, SD = 0.47]) (see Table 13).

Similar results were found for Research Self-Efficacy. Independent samples t-tests indicated scores were significantly different between first year and sixth year and above students ([M = 3.19, SD = 0.81]; [M = 4.05, SD = 0.60]), between second and sixth year and above students ([M = 3.21, SD = 0.75]; [M =4.05, SD = 0.60]), and between third year and sixth year and above students ([M = 3.44, SD = 0.68]; [M =4.05, SD = 0.60]) (see Table 13). This hypothesis was only partially supported, as self-efficacy means across years in school for peer

relationships, advisor relationships, clinical supervisor, and DEI on the 76-Item SEADS did not increase across time (see Table 13).

Convergent and Discriminant Validity

To assess convergent validity, the better-performing 76-Item SEADS was compared to existing measures of self-efficacy in different graduate school domains, including the New General Self-Efficacy Scale (Chen et al., 2001), the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Bandura, 1989; Bandura, 2006), a brief version of the Self-Efficacy in Research Measure (Phillips & Russell, 1994; Kahn & Scott, 1997), the Physical Therapist Self-Efficacy scale (Venskus & Craig 2017), the Multidimensional Scale Perceived Social Support (Zimet et al., 1988), and the Openness to Diversity Scale (Pascarella et al., 1996). Convergent and discriminant validity were assessed at the subscale/factor levels due to the unrelated nature of the overall 76-Item SEADS and the appropriate use of orthogonal rotation. The Social Desirability Scale-17 (Stöber, 2001) was used for discriminant validity.

Convergent validity provides evidence that the subscale is related to and measuring the construct it was intended to measure (Chin & Yao, 2014). Divergent and discriminant validity confirms that constructs expected to have little to no relationship, are in fact not highly correlated to each other (Hubley, 2014). In the present study, it was predicted there would be overlap between the Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy subscales on the 76-Item SEADS, with the New General Self-Efficacy Scale (Chen et al., 2001) and other self-efficacy construct scales. Additionally, it was predicted that there would be small overlap between each of the six subscales on the 76-Item SEADS and social

desirability. Pearson's r correlation demonstrates and measures the strength of a relationship between variables (Ratner, 2009). Several Pearson's r correlation tests were run and demonstrated partial support for convergent and discriminant validity.

Convergent validity of the New General Self-Efficacy Scale (Hypothesis Six). It was predicted that there would be moderate to strong convergent validity ($r \geq .30$) between the New General Self-Efficacy Scale and the Clinical Self-Efficacy subscale, the DEI Self-Efficacy subscale, the Advisor Relationship Self-Efficacy subscale, the Research Self-Efficacy subscale, the Peer Relationship Self-Efficacy subscale, and the Clinical Supervisor Relationship Self-Efficacy subscale. This hypothesis was fully supported, as correlations of the New General Self-Efficacy Scale (Chen et al., 2001) with Clinical Self-Efficacy ($r = .52$), DEI Self-Efficacy ($r = .34$), Advisor Relationship Self-Efficacy ($r = .43$), Research Self-Efficacy ($r = .38$), Peer Relationship Self-Efficacy ($r = .37$), and Clinical Supervisor Relationship Self-Efficacy ($r = .44$) of the 76-Item SEADS demonstrated moderate to strong levels of convergent validity which were significant at the $p = .001$ level (see Table 12).

Convergent validity of the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Hypothesis Seven). It was predicted that there would be moderate to strong convergent validity ($r \geq .30$) of the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (MSPSE; Bandura, 1989; Bandura, 2006) with the Academic Self-Efficacy subscale. This hypothesis was fully supported, as correlation of the Self-Efficacy for Self-Regulated Learning subscale with the Academic Self-Efficacy subscale ($r = .453$) of the 107-Item SEADS demonstrated a moderate level of convergent validity, which was significant at the $p < .001$ level.

Convergent validity of the Multidimensional Scale of Perceived Social Support (Hypothesis Eight). It was predicted that there would be moderate to strong convergent validity ($r \geq .30$). between the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) and the Peer Relationship Self-Efficacy subscale, the Advisor Relationship Self-Efficacy subscale, and the Clinical Supervisor Self-Efficacy subscale. This hypothesis was partially supported, as correlations between the MSPSS (Zimet et al., 1988) and the Peer Relationship Self-Efficacy ($r = .33$) and the Clinical Supervisor Self-Efficacy ($r = .30$) subscales of the 76-Item SEADS demonstrated moderate levels of convergent validity. The MSPSS correlation with the Advisor Relationship Self-Efficacy subscale showed low convergent validity ($r = .22$). However, all levels were significant at the $p < .001$ level (see Table 12).

Convergent validity of the Self-Efficacy in Research Measure-Brief Version (Hypothesis Nine). It was predicted that there would be moderate to strong ($r \geq .30$) convergent validity of the Self-Efficacy in Research Measure-Brief Version (SERM; Kahn & Scott 1997; Phillips & Russell, 1994) with the Research Self-Efficacy subscale. This hypothesis was fully supported, as correlation of the SERM (Kahn & Scott 1997; Phillips & Russell, 1994) with the Research Self-Efficacy subscale ($r = .809$) of the 76-Item SEADS demonstrated a strong level of convergent validity, which was significant at the $p < .001$ level.

Convergent validity of the Physical Therapy Self-Efficacy scale (Hypothesis Ten). It was predicted that there would be moderate to strong ($r \geq .30$) convergent validity of the Physical Therapy Self-Efficacy scale (PTSE; Venskus & Craig, 2017) with the Clinical Self-Efficacy subscale. This hypothesis was fully supported, as correlation of the PTSE (Venskus & Craig, 2017) with the Clinical Self-Efficacy subscale ($r = .742$) of the 76-Item SEADS demonstrated a strong level of convergent validity, which was significant at the $p < .001$ level.

Convergent validity of the Openness to Diversity Scale (Hypothesis Eleven). It was predicated that there would be moderate to strong ($r \geq .30$) convergent validity of the Openness to Diversity Scale (Pascarella et al., 1996) with the Diversity, Equity, and Inclusion (DEI) Self-Efficacy subscale. This hypothesis was fully supported as correlation of the Openness to Diversity Scale (Pascarella et al., 1996) with the DEI Self-Efficacy subscale ($r = .375$) of the 76-Item SEADS demonstrated a moderate level of convergent validity, which was significant at the $p < .001$ level.

Hypothesis Twelve. It was predicted there would be no significant correlations (i.e., $-.30 < r < .30$) between any of the six subscales on the 76-Item SEADS (Clinical Self-Efficacy subscale, DEI Self-Efficacy subscale, Advisor Relationship Self-Efficacy subscale, Research Self-Efficacy subscale, Peer Relationship Self-Efficacy subscale, and Clinical Supervisor Relationship Self-Efficacy subscale).This hypothesis was not supported (see Table 11), as correlations for the Clinical Self-Efficacy subscale were significant, with DEI Self-Efficacy ($r = .51$), Advisor Relationship Self-Efficacy ($r = .43$), Research Self-Efficacy ($r = .46$), Peer Relationship Self-Efficacy ($r = .36$), and Clinical Supervisor Relationship Self-Efficacy ($r = .52$). Correlations for the DEI Self-Efficacy subscale were significant, with Advisor Relationship Self-Efficacy ($r = .48$), Research Self-Efficacy ($r = .33$), Peer Relationship Self-Efficacy ($r = .42$), and Clinical Supervisor Relationship Self-Efficacy ($r = .43$). Correlations for the Advisor Relationship Self-Efficacy subscale were significant, with Research Self-Efficacy ($r = .34$), Peer Relationship Self-Efficacy ($r = .47$), and Clinical Supervisor Relationship Self-Efficacy ($r = .62$). Correlations for the Research Self-Efficacy subscale were significant, with Peer Relationship Self-Efficacy ($r = .14$) and Clinical Supervisor Relationship Self-Efficacy ($r = .25$). The

correlation for the Peer Relationship Self-Efficacy subscale and Clinical Supervisor Relationship Self-Efficacy was significant (r = .43).

Table 11

Correlation of 76-Item SEADS Factors

Scale/ Factor Name	**M**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**
76-Item SEADS								
1. Clinical Self-Efficacy	4.29	0.59	1					
2. DEI Self-Efficacy	4.09	0.64	.509**	1				
3. Advisor Relationship Self-Efficacy	3.92	0.90	.431**	.480**	1			
4. Research Self-Efficacy	3.37	0.75	.464**	.325**	.339**	1		
5. Peer Relationship Self-Efficacy	4.27	0.70	.362**	.424**	.465**	.135**	1	
6. Clinical Supervisor Relationship Self-Efficacy	4.07	0.79	.523**	.433**	.617**	.247**	.428**	1

Note. **Correlation is significant at the .001 level
SEADS = Self-Efficacy of Applied Doctoral Students scale
DEI = Diversity, Equity, and Inclusion

Discriminant validity with Social Desirability Scale (Hypothesis Thirteen). It was predicted that there would be low correlations (-.30 < r < .30) between the Social Desirability Scale-17 (SDS-17; Stöber, 2001) with the Clinical Self-Efficacy subscale, DEI Self-Efficacy subscale, Advisor Relationship Self-Efficacy subscale, Research Self-Efficacy subscale, Peer Relationship Self-Efficacy subscale, and Clinical Supervisor Relationship Self-Efficacy subscale

of the 76-Item SEADS (see Table 12). This hypothesis was fully supported, as correlations of the Clinical Self-Efficacy subscale (r = .09), DEI Self-Efficacy subscale (r = .18), Advisor Relationship Self-Efficacy subscale (r = .16), Research Self-Efficacy subscale (r = .11), Peer Relationship Self-Efficacy subscale (r = .10), and Clinical Supervisor Relationship Self-Efficacy subscale (r = .17) indicated low overlap with the Social Desirability Scale-17 (Stöber, 2001).

Table 12

Correlation of 76-Item SEADS with Convergent and Discriminant Validity Scales

Scale/ Factor Name	**M**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**
76-Item SEADS								
1. Clinical Self-Efficacy	4.29	0.59	1					
2. DEI Self-Efficacy	4.09	0.64	.509**	1				
3. Advisor Relationship Self-Efficacy	3.92	0.90	.431**	.480**	1			
4. Research Self-Efficacy	3.37	0.75	.464**	.325**	.339**	1		
5. Peer Relationship Self-Efficacy	4.27	0.70	.362**	.424**	.465**	.135**	1	
6. Clinical Supervisor Relationship Self-Efficacy	4.07	0.79	.523**	.433**	.617**	.247**	.428**	1
7. New General Self-Efficacy Scale	4.15	0.65	.515**	.341**	.427**	.376**	.396**	.441**
8. Multidimensional Scale of Perceived Social Support	5.93	0.93	--	--	.222**	--	.333**	.299**

9. Social Desirability Scale-17	7.25	3.89	.094*	.180**	.155*	.105*	.100*	.166**

Note. **Correlation is significant at the .001 level
*Correlation is significant at the .05 level
SEADS = Self-Efficacy of Applied Doctoral Students scale
DEI = Diversity, Equity, and Inclusion

Post Hoc Analyses

Although we had no specific hypotheses, we wished to explore if type of professional program (clinical psychology, counseling psychology, school psychology, nursing, occupational therapy, and physical therapy), gender identity, racial/ethnic identity, and current self-report of mental health (as measured by PHQ-8 and GAD-7) showed differences on average levels of each of the six subscales of the 76-Item SEADS. A one-way between-subjects ANOVA was conducted to compare the effect of the field of study on self-efficacy measured by the 76-Item SEADS. Due to small sample sizes within the disciplines of counselor education, social work, and nutrition analyses were only conducted between clinical psychology, counseling psychology, school psychology, nursing, occupational therapy, and physical therapy. There were no significant differences in Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy from the 76-Item SEADS based on the participant's field of study (see Table 13). There was also no significant difference between the field of study and self-efficacy on the NGSE (Chen et al., 2001).

Analyses were run to assess differences in self-efficacy between genders. Gender was defined to encompass men (e.g., cisgender and transgender men), women (e.g., cisgender and transgender women), and non-binary individuals. There were no significant differences in self-efficacy means on Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy,

Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy based on gender identity (See Table 13).

A one-way between-subjects ANOVA was conducted to compare the effect of race on self-efficacy. When participants were grouped by race (e.g., White, Asian American/Pacific Islander, Black/African American, Hispanic/Latinx, Middle Eastern, Native American/Alaskan Native, Biracial/Multiracial) there were no significant differences in the six SEADS subscales (see Table 13). However, when participants in ethnic/racial groups were combined to represent BIPOC identified individuals, there was a significant difference in DEI Self-Efficacy between White HPT doctoral students (M = 4.04, SD = 0.653) and BIPOC HPT doctoral students (M = 4.23, SD = 0.593), with BIPOC HPT doctoral students showing higher DEI self-efficacy.

Table 13

One Way ANOVA of 76-Item SEADS Subscales and Demographic Data

Comparison Variable	***M***	***SD***	***df***	***F***	***P***
Field of Study					
1. Clinical Self-Efficacy			5,328	2.133	.061
Clinical Psychology	4.26	0.625			
Counseling Psychology	4.37	0.561			
Nursing	4.67	0.341			
Occupational Therapy	4.14	0.658			
Physical Therapy	4.28	0.495			
School Psychology	4.34	0.596			
2. DEI Self-Efficacy			5,328	0.145	.981
Clinical Psychology	4.06	0.684			
Counseling Psych	4.08	0.547			
Nursing	4.03	0.655			
Occupational Therapy	4.08	0.655			
Physical Therapy	4.15	0.694			
School Psychology	4.09	0.583			
3. Advisor Relationship Self-Efficacy			5,328	1.399	.224

Comparison Variable	*M*	*SD*	*df*	*F*	*P*
Clinical Psychology	3.83	0.899			
Counseling Psych	3.97	0.710			
Nursing	4.36	0.588			
Occupational Therapy	4.01	0.890			
Physical Therapy	4.05	0.777			
School Psychology	3.82	1.000			
4. Research Self-Efficacy			5,328	1.465	.201
Clinical Psychology	3.43	0.801			
Counseling Psych	3.39	0.795			
Nursing	3.82	0.584			
Occupational Therapy	3.28	0.677			
Physical Therapy	3.25	0.711			
School Psychology	3.38	0.810			
5. Peer Relationship Self-Efficacy			5,328	1.122	.349
Clinical Psychology	4.23	0.689			
Counseling Psych	4.06	0.765			
Nursing	4.50	0.432			
Occupational Therapy	4.27	0.788			
Physical Therapy	4.36	0.564			
School Psychology	4.30	0.703			
6. Clinical Supervisor Relationship Self-Efficacy			5,328	1.395	.226
Clinical Psychology	4.01	0.747			
Counseling Psych	4.20	0.666			
Nursing	4.47	0.493			
Occupational Therapy	3.99	0.885			
Physical Therapy	4.17	0.678			
School Psychology	4.14	0.805			
7. New General Self-Efficacy Scale			9,287	0.440	.913
Clinical Psychology	4.11	0.714			
Counseling Psych	4.14	0.475			
Nursing	4.44	0.457			
Occupational Therapy	4.16	0.708			
Physical Therapy	4.13	0.492			
School Psychology	4.13	0.702			
Year in School					
1. Clinical Self-Efficacy			5,304	5.663	<.001**

Comparison Variable	*M*	*SD*	*df*	*F*	*P*
1st	4.15	0.68			
2nd	4.08	0.59			
3rd	4.43	0.47			
4th	4.45	0.50			
5th	4.20	0.80			
6th+	4.70	0.47			
2. DEI Self-Efficacy			5,304	0.772	.570
1st	4.16	0.69			
2nd	4.09	0.54			
3rd	4.09	0.69			
4th	4.11	0.52			
5th	3.87	0.70			
6th+	3.97	0.64			
3. Advisor Relationship Self-Efficacy			5,304	0.881	.494
1st	3.97	0.78			
2nd	3.99	0.86			
3rd	3.97	0.87			
4th	3.90	0.95			
5th	3.71	0.90			
6th+	3.57	1.14			
4. Research Self-Efficacy			5,304	4.764	<.001**
1st	3.19	0.81			
2nd	3.21	0.75			
3rd	3.44	0.68			
4th	3.45	0.70			
5th	3.57	0.65			
$6th^{+}$	4.05	0.60			
5. Peer Relationship Self-Efficacy			5,304	0.506	.772
1st	4.22	0.74			
2nd	4.36	0.59			
3rd	4.20	0.77			
4th	4.28	0.64			
5th	4.13	0.83			
6th+	4.31	0.68			
6. Clinical Supervisor Relationship Self-Efficacy			5,304	1.332	.251
1st	3.91	0.87			
2nd	4.13	0.63			
3rd	4.08	0.79			

Comparison Variable	*M*	*SD*	*df*	*F*	*P*
4th	4.17	0.67			
5th	4.06	0.87			
6th+	4.35	0.87			
Gender Identity					
1. Clinical Self-Efficacy			2,304	0.898	.408
Cisgender men	4.20	0.577			
Cisgender women	4.32	0.596			
Nonbinary	4.144	0.711			
2. DEI Self-Efficacy			2,304	0.820	.441
Cisgender men	3.96	0.877			
Cisgender women	4.10	0.618			
Nonbinary	4.22	0.567			
3. Advisor Relationship Self-Efficacy			2,304	1.490	.227
Cisgender men	3.65	1.173			
Cisgender women	3.95	0.811			
Nonbinary	3.85	1.433			
4. Research Self-Efficacy			2,304	0.126	.881
Cisgender men	3.33	0.966			
Cisgender women	3.38	0.718			
Nonbinary	3.46	0.828			
5. Peer Relationship Self-Efficacy			2,304	0.642	.527
Cisgender men	4.10	0.843			
Cisgender women	4.26	0.700			
Nonbinary	4.22	0.748			
6. Clinical Supervisor Relationship Self-Efficacy			2,304	0.025	.976
Cisgender men	4.10	0.701			
Cisgender women	4.07	0.777			
Nonbinary	4.04	0.992			
Individual Race/Ethnicity					
1. Clinical Self-Efficacy			6,302	0.535	.781
White	3.40	0.704			
Black/African American	3.02	0.941			
Hispanic/Latinx	4.37	0.735			
Asian/Pacific Islander	4.20	0.595			
Native American/Alaskan Native	4.87	-			
Multiracial/Biracial	4.39	0.586			
Middle Eastern	3.80	-			

Comparison Variable	*M*	*SD*	*df*	*F*	*P*
2. DEI Self-Efficacy			6,302	1.420	.207
White	4.04	0.653			
Black/African American	4.05	0.839			
Hispanic/Latinx	3.88	0.976			
Asian/Pacific Islander	4.06	0.672			
Native American/Alaskan Native	4.71	-			
Multiracial/Biracial	4.13	0.655			
Middle Eastern	4.00	-			
3. Advisor Relationship Self-Efficacy			6,302	0.290	.942
White	3.94	0.875			
Black/African American	3.97	0.826			
Hispanic/Latinx	3.93	0.877			
Asian/Pacific Islander	3.90	0.777			
Native American/Alaskan Native	4.67	-			
Multiracial/Biracial	3.80	1.00			
Middle Eastern	3.67	-			
4. Research Self-Efficacy			6,302	1.375	.224
White	3.40	0.704			
Black/African American	3.02	0.941			
Hispanic/Latinx	3.70	0.759			
Asian/Pacific Islander	3.13	0.779			
Native American/Alaskan Native	3.73	-			
Multiracial/Biracial	3.38	0.881			
Middle Eastern	3.13	-			
5. Peer Relationship Self-Efficacy			6,302	1.005	.422
White	4.25	0.727			
Black/African American	4.06	0.804			
Hispanic/Latinx	3.93	0.744			
Asian/Pacific Islander	4.37	0.523			
Native American/Alaskan Native	4.73	-			
Multiracial/Biracial	4.34	0.637			
Middle Eastern	3.55	-			
6. Clinical Supervisor Relationship Self-Efficacy			6,302	0.272	.950
White	4.08	0.796			
Black/African American	4.05	0.839			

Comparison Variable	*M*	*SD*	*df*	*F*	*P*
Hispanic/Latinx	3.88	0.976			
Asian/Pacific Islander	4.06	0.672			
Native American/Alaskan Native	4.71	-			
Multiracial/Biracial	4.13	0.655			
Middle Eastern	4.00	-			
Racial Groups (White and BIPOC)					
1. Clinical Self-Efficacy			1,307	0.228	.633
White	4.29	0.597			
BIPOC	4.32	0.613			
2. DEI Self-Efficacy			1,307	5.429	.020*
White	4.04	0.653			
BIPOC	4.23	0.593			
3. Advisor Relationship Self-Efficacy			1,307	0.339	.561
White	3.94	0.875			
BIPOC	3.88	0.900			
4. Research Self-Efficacy			1,307	0.837	.361
White	3.40	0.704			
BIPOC	3.31	0.859			
5. Peer Relationship Self-Efficacy			1,307	0.066	.797
White	4.25	0.727			
BIPOC	4.23	0.673			
6. Clinical Supervisor Relationship Self-Efficacy			1,307	0.002	.966
White	4.08	0.800			
BIPOC	4.07	0.733			

Note. **Correlation is significant at the .001 level
*Correlation is significant at the .05 level
SEADS = Self-Efficacy of Applied Doctoral Students scale
DEI = Diversity, Equity, and Inclusion

Frequencies were run on the number of participants in each severity category of the Patient Health Questionnaire (PHQ-8; Kroenke et al., 2009) and Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006). 40.6% of students reported depression symptoms in the minimal range (0 – 4 points), 28.7% reported mild depression symptoms (5 – 9 points), 19.7%

reported moderate depression symptoms (10 – 14 points), 8.8% reported moderately severe depression symptoms (15 – 19 points), and 2.2% reported severe depression symptoms (20 – 27 points) (Kroenke et al, 2009). For the GAD-7, 32.2% of students reported minimal anxiety symptoms (0 – 4 points), 35.9% reported mild anxiety symptoms (5 – 9 points), 19.3% reported moderate anxiety symptoms (10 – 14 points), and 12.6% reported severe anxiety symptoms (15 or more points) (Spitzer et al., 2006).

Participants' depression and anxiety scores were correlated with all six subscales on the 76-Item SEADS (see Table 14). Depression symptoms and anxiety symptoms were significantly negatively correlated with Clinical Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy subscales. As expected, depression and anxiety were also strongly correlated with each other.

Table 14

Correlation of 76-Item SEADS with Depression and Anxiety Measures

Scale/ Factor Name	**Generalized Anxiety Disorder (GAD-7)**	**Patient Health Questionnaire (PHQ-8)**
1. Clinical Self-Efficacy	-.145**	-.189**
2. DEI Self-Efficacy	-.052	.035
3. Advisor Relationship Self-Efficacy	-.144**	-.141**
4. Research Self-Efficacy	-.137*	-.122*
5. Peer Relationship Self-Efficacy	-.163**	-.134*
6. Clinical Supervisor Relationship Self-Efficacy	-.198**	-.177**

Note. **Correlation is significant at the .001 level
*Correlation is significant at the .05 level
SEADS = Self-Efficacy of Applied Doctoral Students scale

DEI = Diversity, Equity, and Inclusion

Discussion

This concluding section of the dissertation reviews the interpretation, implications, and limitations of the Self-Efficacy of Applied Doctoral Students (SEADS) scale development and pilot study. Currently there is a gap in the literature regarding existing scales that measure self-efficacy at the doctoral student level and across different domains of graduate school. Many existing scales measure broad self-efficacy (Chen et al., 2001; Fertman & Primack, 2009), self-efficacy at the undergraduate level (Chemers et al., 2001; Owen & Robin, 1988), and self-efficacy in specific fields (e.g., counseling, nursing; Melchert et al., 1996; Venskus & Craig, 2017; Stump et al., 2012). In the case of academic relationships, there are only measures of working alliance (Efstation et al., 1990; Schlosser & Gelso, 2001) and no self-efficacy scales exist at all.

This scale was based on both Social Cognitive Theory, a theory that explains how individuals initiate and maintain behavior to achieve goal directed accomplishments over long periods of time (Bandura, 1991), and on a study from William's (2005) that suggested the three domains making up graduate student self-efficacy: academics, research, and social self-efficacy. We decided to add Clinical Self-Efficacy which is specific to HPT programs since researchers have shown it to be a critical component of overall graduate student self-efficacy (Lent et al., 2003; Baylor, 2019; Van Horn & Christman, 2017; Wolden et al., 2019). We rounded out the scale by adding self-efficacy for handling issues of diversity, equity, and inclusion within their programs, as these factors can impact socialization, satisfaction levels, and commitment to degree completion (Ellis, 2001). Perceived self-efficacy has been defined by Bandura (1997) as an individual's belief in their ability to complete a task or perform to their expectations, as is believed to influence effort, persistence, and achievement (Bandura, 1994; Bandura, 1997). This

construct is critical component to doctoral student success, as it has been shown to impact academic outcomes (Hsieh et al., 2007; Pintrich & DeGroot, 1990), research productivity (Phillips et al., 1994), clinical functioning (Lent et al., 2003; Larson & Daniels, 1998), cohort/peer relationships (Jairam & Kahl, 2012), and faculty member relationships (Gardner & Barnes, 2007).

We narrowed the population further to Health Profession Trainee (HPT) doctoral students, due to their unique experience of balancing multiple roles in graduate school, including teacher, researcher, student, clinician, supervisor/supervisee, peer, advocate, and more. Fields of psychology, social work, occupational therapy, physical therapy, nursing, nutrition were identified as the health professional training doctoral programs requiring their students to manage all these roles, unlike a more traditional research focused Ph.D. As medical knowledge expanded and unmet patient needs were identified, new degrees were developed (Britt, 2007), leading to an increase in popularity of clinical doctoral degrees (Seegmiller et al., 2015). Considering the increase in programs and HPT students, self-efficacy's correlation with time to degree completion (Wao & Onwuegbuzie, 2011), and the importance of time to degree completion, it will be valuable to have a tool to assess self-efficacy within these programs.

Our purpose was to develop and provide initial norming and validity information for the SEADS. Centered in health and behavioral health professions, the SEADS measures Health Professional Trainee (HPT) doctoral students' belief in their ability to succeed in graduate school tasks, including academics, research, clinical/field placements, relationships with peers, advisors, and supervisors, and diversity, equity, and inclusion. The final result of the exploratory study produced a six-factor scale representative of a wide variety of tasks a clinical doctoral student must complete in the six graduate school domains named above.

Factor Structure

It was originally hypothesized that the SEADS would demonstrate a five-factor structure, representative of the five identified graduate school domains: Academic Self-Efficacy, Research Self-Efficacy, Clinical Self-Efficacy, Relationship Self-Efficacy (e.g., peer, advisor, clinical supervisor), and DEI Self-Efficacy. Maximum Likelihood with a Varimax rotation was utilized as they are one of the most used estimation methods in exploratory factor analysis (Watson, 2017) and appropriate to use when the factors are assumed to be unrelated (Mvududu & Sink, 2013).

However, exploratory factor analysis indicated the emergence of a six-factor structure in the revised, 76-Item SEADS. Upon further analysis, it was determined the predicted "Relationship Self-Efficacy" subscale split into three separate subscales, based on each type of relationship: peer, advisor, and clinical supervisor. This is similar to the Multidimensional Scale Perceived Social Support (Zimet et al., 1988), which splits into significant other, family, and friends. Additionally, the Academic Self-Efficacy subscale fell out of the final factor structure. This was not surprising as many expert reviewers expressed concern the academic items were "too elementary" and might skew positively. At this level of graduate education, doctoral students likely have mastered academic and classroom tasks, such as writing essays and studying for tests. This would explain why items skewed positively as they have reached the ceiling of self-efficacy based on years of experience succeeding in school.

Factor loadings on the 76-Item version of the SEADS were all above .40 with the majority above .60. The total variance accounted or across the six factors was approximately 56 percent. This compares with the New General Self-Efficacy Scale (Chen et al., 2001), which had an overall variance explained of 52 and 59 percent as well as other field specific self-efficacy

scales, including the College Chemistry Self-Efficacy Scale (Uzuntiryaki & Capa Aydin, 2009), with overall variance explained at 51 percent. Overall, the SEADS did not hold up to its originally hypothesized five-factor structure, however once revised, the six-factor structure of the 76-Item SEADS demonstrated evidence of strong internal structure. This will need to be further assessed with a confirmatory factor analysis.

Item Analysis

The original SEADS started with 107 items and after item analysis, it was determined 31 items needed to be dropped due to poor item loadings, cross loadings, restricted range, or loading on a ninth factor. The entire Academic Self-Efficacy subscale was also dropped (12 items) as items did not show needed variance, and additionally, two Peer Relationship Self-Efficacy items were dropped, four Clinical Supervisor Relationship Self-Efficacy items were dropped, and 13 DEI Self-Efficacy subscale items were dropped. Speculation on the poor loadings of the Academic Self-Efficacy and DEI Self-Efficacy subscale items are discussed in the content validity section.

For the four Clinical Supervisor Relationship Self-Efficacy items (*"4. I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor," "7. I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor," "10. I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor,"* and *"11. I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor"*) had factor loadings that were appropriate (> .40), but the items additionally cross-loaded with the Clinical Self-Efficacy subscale. In a future version of this scale, these items should be rewritten to focus more on the relationship with the supervisor and less on clinical skills.

In terms of the peer-relationship items, it is possible the first Peer Relationship Self-Efficacy item fell out (*"8. I am confident in my ability to confront my peers/cohort about problems"* [.393]) due to the focus on conflict inherent to that item. Researchers have explored how individuals may withhold complaints due to fear of negative consequences (Newell & Strutman, 1991), or because they find the problems unimportant (Baxter & Wilmot, 1985), and this may be a unique subcomponent of peer relationships. It is possible certain students feel uncomfortable addressing these issues or do not feel close enough to peers to feel the need to address issues. Additionally, "confront" may have been perceived too strongly. For the CFA, the item could be phrased using "address" or "discuss." For the second item we dropped, (*"10. I am confident in my ability to provide resources/materials for peers in my doctoral program"* [.374]), it could be due to phrasing within the item. Kram and Isabella (1985) have suggested peer groups are a valuable information source, sharing work and personal information, while Lovitts (2001) notes sharing resources is part of doctoral student subculture. It is possible the question was not specific enough in noting "school related resources/materials" and can be edited for the future CFA.

Excluding the above suggested changes to specific items, 76 items on the SEADS loaded at moderate to strong levels (Osbourne & Costello, 2004) with no cross loading, providing evidence of good factor structure (Tavakol & Wetzel, 2020).

Content and Construct Validity

Evidence related to the content and construct validity of the scales is discussed next.

Content Validity

A scale has good content validity when the sample of items represents adequate operational definition of the construct of interest (Polit & Beck, 2006). In the social sciences,

researchers suggest measures be clear, concise, and appropriate for the targeted population (Rubio et al., 2003). The aim of the present study was to create a clear and comprehensive measure of doctoral student self-efficacy which is psychometrically sound.

The SEADS Scale is grounded in the Social Cognitive Theory (SCT; Bandura, 1991), which explains how individuals maintain their behavior through reinforcement to achieve goal directed behaviors over long periods of time. The theory is widely used to understand classroom learning, student motivation, and academic achievement (Costlow & Bornstein, 2018). Housed under the larger umbrella of SCT, is self-efficacy, which allows individuals to gather and evaluate information about their individual capabilities, which in turn helps determine if an individual will initiate behaviors, how much effort they will expend, and how long they will sustain their efforts (Stajkovic & Luthans, 2001). The most influential source on increasing self-efficacy is performance accomplishments and personal mastery experiences (Bandura, 1994). The SEADS intended to measure HPT doctoral students' belief in their ability to accomplish and succeed in tasks specific to graduate school domains.

Content validity was initially assessed through expert item review (DeVellis, 2017) and post hoc analysis. Nine experts in either a professional health field and or in scale development provided ratings on the items of the scale. These expert reviewers provided both quantitative and qualitative feedback on necessity of the item, predicted subscale of the item, item wording, scale structure, and item clarity. They were also asked to suggest additional items or missing domain areas.

Regarding the initial item pool, reviewers noted strong agreement on item to subscale match (e.g., items we expected to fit under Research Self-Efficacy, expert reviewers agreed with) and had no suggestions on items to add to the scale, which suggests evidence we were accurately

and fully assessing each self-efficacy factor (DeVellis, 2017). More specifically, reviewers agreed that all five self-efficacy subscales (Academic Self-Efficacy; Research Self-Efficacy, Clinical Self-Efficacy; Relationship Self-Efficacy [advisor, clinical supervisor, peers], and DEI Self-Efficacy) were relevant to the definition of overall HPT doctoral student self-efficacy and we were not missing any additional ways to measure the phenomenon (DeVellis, 2017). Additionally, reviewers rated the vast majority of items as "necessary" or "useful", suggesting most of the original items of the SEADS were relevant to measuring self-efficacy.

Expert reviewers expressed concerns with academic items being "too elementary" for doctoral level students and lacking specificity. Many self-efficacy scales either ask broad questions about academic self-efficacy (e.g., "Finish my homework assignments by deadlines" [Bandura, 1989]) or ask specific questions related to the academic field (e.g., "How well can you describe the properties of elements by using periodic table?" [Uzuntiryaki & Capa Aydin, 2009]). Following Bandura's guide for developing self-efficacy scales, he suggests items are task specific and rely on a "good conceptual analysis of relevant domain functioning" (Bandura, 2006, p. 310). Even though the Academic Self-Efficacy subscale items followed the format of previous self-efficacy scales and were task specific, expert reviewers were accurate and the items skewed positively and had a restricted range. Consequently, classroom-related Academic Self-Efficacy items were removed from the original SEADS scale as part of forming the 76-Item SEADS revised version.

Expert reviewers additionally expressed concerns that some of the research questions would not apply to all doctoral students, specifically the statistical analysis questions and writing a manuscript for publication. These items held up in the analysis, but the item "I am confident in my ability to accurately analyze qualitative data" did have a lower item loading (.42). For the

CFA, we will consider combining the qualitative data analysis and quantitative data analysis items into one item, so the item might read "I am confident in my ability to accurately analyze data (either quantitively or qualitatively)."

There was also a theme amongst the expert reviews about the Relationship Self-Efficacy items (e.g., peers, advisor, and clinical supervisor) and whether they were addressing the student's belief in their ability to build a relationship or if the items were asking more about the qualities and personality of the advisor or supervisor. There are not currently any self-efficacy scales about building a relationship with advisors or clinical supervisors. To remedy the possible issue of supervisors/advisor personality becoming a confounding variable, we added the following instructions to be read prior to answering relationship self- efficacy questions: "For the following questions, your advisor and clinical supervisor/preceptor can be from a group or individual setting and can be from a past or current relationship. Try to separate out your sense of skills from who your actual advisor or supervisor is." In adding these instructions, it was our intent that HPT doctoral students would rate their perceptions of their skills rather than the climate created by and advisor or supervisor, though we recognize that these concerns are intertwined.

Similar concerns were raised about 12 of the DEI Self-Efficacy subscale items. Specifically, expert reviewers expressed worry that the items were not asking about an individual student's belief in their ability to implement DEI, but rather a reflection of the program's cultural environment. Items included "I am confident in my ability to receive support in a doctoral program environment if I am being discriminated against" and "I am confident in my ability to seek out support in a doctoral program environment when I experience oppression/discrimination." It is particularly important for doctoral students in helping

professions to have self-efficacy in handling DEI concerns as they will likely need skills to address societal problems and engage with others across differences in social identities, values, and beliefs (Perez et al., 2020). Based on this feedback, and the poor performance of these items on the EFA, these items were removed from the original SEADS to form a more effective 76-Item SEADS. It is possible these items are measuring a different construct, such as help seeking, defined by Rickwood and Thomas (2006) as, "an adaptive coping process that is the attempt to obtain external assistance to deal with a mental health concern" (p. 180). As many of the problematic items were dropped from the revised version of the 76-Item SEADS, the positive feedback about factor structure and item to factor match suggest evidence of content validity for the SEADS.

Construct Validity

In terms of construct validity of the SEADS, we expected HPT doctoral student self-efficacy to increase over time, as students acquire more knowledge and mastery experiences in successfully completing graduate school skills, which has the most influence on self-efficacy (Bandura,1997). Construct validity analyses (e.g., ANOVAs and t-tests) were run to evaluate the effect of year in program on level of self-efficacy. These analyses found significant effects for Clinical and Research Self-Efficacy subscales. For Research Self-Efficacy, mean level of self-efficacy increased each year, from year one to year six and above. For Clinical Self-Efficacy, self-efficacy increased from year two to year three, year three to year four, and year four to year six and above. There were no significant effects of year on the other four subscales. It is possible that doctoral students come into graduate school with different levels of advisor, clinical supervisor, peer, and DEI self-efficacy based on prior experiences, whereas clinical skills and research skills, more people start at the same baseline. It is possible relationship characteristics

were a confounding variable since advisor and peer relationships may stabilize early in an HPT doctoral program.

A final factor to consider in the lack of change for the domains of Peer Relationship Self-Efficacy, Advisor Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy and DEI Self-Efficacy over time may be burnout. The population sampled are HPT doctoral students who have been training for helping and healthcare professions during a pandemic. Studies have shown nursing students experience higher burnout post clinical training than pre-clinical training (Ayaz-Alkaya et al., 2018) and other research demonstrated 54% of health professions students experienced elevated stress and burnout prior to the pandemic (Pospos et al., 2018). Burnout has been shown to reduce self-efficacy (Jackson & Maslach, 1982; Mardani et al., 2015), and may be a variable impacting the maintenance or decrease of self-efficacy throughout time in the program.

Aside from further investigation of why other factors of self-efficacy didn't increase over time in the confirmatory factor analysis, the increase of Clinical and Research Self-Efficacy over time provides evidence of good construct validity for the SEADS. Convergent and divergent validity are explored in the next sections.

Convergent Validity

Convergent validity is the evidence that different tests designed to measure the same trait, do measure the same construct (Zhu, 2000) and divergent validity (or discriminant validity) is when measures designed to measure different traits are indeed dissimilar (Zhu, 2000). To assess convergent validity, the SEADS subscales were compared to existing measures of self-efficacy, including the New General Self-Efficacy Scale (NGSE; Chen et al., 2001), the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy

(Bandura, 1989; Bandura, 2006), a brief version of the Self-Efficacy in Research Measure (SERM; Phillips & Russell, 1994; Kahn & Scott, 1997), the Physical Therapist Self-Efficacy scale (PTSE; Venskus & Craig 2017; revised for this study to be appropriate for all HPT doctoral students), the Multidimensional Scale Perceived Social Support (MSPSS; Zimet et al., 1988), and the Openness to Diversity Scale (ODS; Pascarella et al., 1996).

The first measure of used to establish convergent validity was the NGSE, a measure of broad, general self-efficacy. All six subscales of the SEADS (Research Self-Efficacy, Clinical Self-Efficacy, Peer Relationship Self-Efficacy, Advisor Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy, and DEI Self-Efficacy) were moderately related to the NGSE (Chen et al., 2001). This is expected since the SEADS intends to measure self-efficacy, but at a much more specific level—the six domains of HPT doctoral student self-efficacy. These results are slightly lower than other studies validating measures of specific self-efficacy. For example, the Physical Therapist Self-Efficacy scale (PTSE; Venskus & Craig 2017) demonstrates strong convergent validity with the NGSE. It is possible the SEADS is a much more specific measure of self-efficacy, tailored to HPT doctoral students whereas the PTSE was modeled specifically after the NGSE and has fewer items. However, other more specific self-efficacy measures (Self-Efficacy after ICD Implantation) have shown moderate correlations with General Self-Efficacy Scale (.48 and .40; Dougherty et al., 2009) which is similar to the present study. This suggests the SEADS demonstrated appropriate convergence with a measure of general self-efficacy and provides evidence each subscale of the SEADS accurately taps into the construct of self-efficacy.

The Academic Self-Efficacy subscale moderately related to the Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy

(Bandura, 1989; Bandura, 2006). Both the Academic Self-Efficacy subscale and the Self-Efficacy for Self-Regulated Learning subscale for the present study demonstrated restricted range and positive skew of means. This suggests as mentioned in previous sections of this paper, that HPT doctoral students are scoring at the ceiling of academic self-efficacy measures. This would make sense, as these students have had several years of higher educational classroom experience and may have started their doctoral program feeling confident in their academic skills. Other academic self-efficacy scales have demonstrated convergent validity through moderate correlation with GPA from the current semester (r = .34) (Uzuntiryaki & Capa Aydin, 2008; Owen & Froman, 1988). The present study reflects weak correlation between GPA and the SEADS Academic Self-Efficacy subscale (r = .208). These results suggest weak evidence that the Academic Self-Efficacy subscale accurately measured the construct of academic self-efficacy and demonstrates a need for further study and development of the items on this subscale.

The Research Self-Efficacy subscale was strongly related to the brief version of the SERM (Phillips & Russell, 1994; Kahn & Scott, 1997), as one might expect due to the specificity and similarity in construct. This is slightly higher than other convergent measures of research self-efficacy. For example, the Research Self-Efficacy Scale (Bieschke et al., 1996; similarly, to the SERM which is normed for graduate students) was used as a measure of convergent validity for the development of the Faculty Research Self-Efficacy Scale (FaRSES; Wester et al., 2019). This new scale demonstrated a moderate to moderately strong correlation. More similar to our scale, the Research Attitudes Measure (O'Brien et al., 1998) demonstrated a strong relationship to the SERM. As our questions were modeled closely to the SERM, which was normed on graduate students, we would expect the scales to be similar as produced in the

second study. This suggests our Research Self-Efficacy subscale measured the construct of research self-efficacy similarly to other validated measures.

The Clinical Self-Efficacy subscale was strongly related to the PTSE (Venskus & Craig, 2017), as expected due to the similarity of the constructs. This is on par with other measures of clinical self-efficacy. For example, the Counselor Self-Efficacy Scale demonstrated strong correlation with a measure of self-efficacy of counselor performance (Self-Efficacy Inventory; Friedlander & Snyder, 1983). Another clinical skills scale, the Basic Resuscitation Skills Self-Efficacy Scale demonstrated moderate to strong relationship to a similar Resuscitation Self-Efficacy Scale (Hernández-Padilla et al., 2016). In the present study, our Clinical Self-Efficacy subscale produced similar levels of convergent validity as demonstrated amongst other clinical skills self-efficacy scales. This suggests evidence that the Clinical Self-Efficacy subscale accurately measures the construct of clinical self-efficacy.

The DEI Self-Efficacy subscale was moderately related to the ODS (Pascarella et al., 1996). This is not surprising, as our subscale was attempting to measure a doctoral student's belief in their ability to accomplish DEI related tasks, whereas the ODS measures attitudes and openness towards diversity. While attitude and openness to diversity may influence self-efficacy, the two constructs are different, so they appropriately diverged from each other. Further the ODS only measures openness to diversity (Pascarella et al., 1996), whereas cultural efficacy has been defined to encompass belief in one's ability to motivate others, utilize cognitive resources, and take action in situations of cultural diversity (Briones et al., 2009). It is likely our DEI Self-Efficacy subscale not only measured attitudes towards diversity, but also belief in ability to motivate others and act. These may be important aspects to validate in future studies. The

moderate correlation between ODS and DEI Self-Efficacy suggest evidence of the subscale measuring openness to diversity and other aspects of DEI not captured in the convergent scale.

The three relationship subscales were weak to moderately related to the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988). Not surprisingly, Peer Relationship Self-Efficacy showed the stronger relationship of the three, but Advisor and Clinical Supervisor Relationship Self-Efficacy did not correlate as well. This would make sense considering the MSPSS measured perception of social support from Significant Others, Family, and Friends versus the SEADS which intended to measure self-efficacy of building and maintaining relationships with peers, advisors, and clinical supervisors. The MSPSS does not capture the evaluative aspect and power dynamics that may impact self-efficacy of building and navigating relationships with advisors and supervisors versus peers and loved ones. We would also expect our subscales to diverge from the MSPSS, since they do not measure professional relationships, navigating conflict, or belief in one's ability to maintain relationships.

Studies have shown that general self-efficacy is moderately correlated with support from family, peers, and friends (Yusoff, 2012). The present study demonstrated weak to moderate correlations from the NGSE and MSPSS. Additionally, research on the impact of supervisory working alliance has shown changes in trainee self-efficacy over time (Ladany et al., 1999). As discussed above in construct validity, there was no significant change in self-efficacy over time for Peer Relationship Self-Efficacy, Advisor Relationship Self-Efficacy, or Clinical Supervisor Relationship Self-Efficacy. These two results may suggest that the participants do not have supportive professional relationships, that their relationships stabilized early in their program and have not changed, or there are confounding relationship factors playing a role in self-efficacy. It is also important to note that unlike clinical and research skills being actively trained in HPT

doctoral programs, relationship skills are not, which may also impact self-efficacy. For the confirmatory factor analysis, it may be beneficial to add measures of working alliance with a supervisor and advisor to assess relationships in a professional setting and be less focused on social support. These results suggest evidence that Peer Relationship and Clinical Supervisor Relationship Self-Efficacy subscales measure some level of social support, but further analysis is needed to determine convergent validity of the Advisor Self-Efficacy subscale.

Overall, the hypotheses regarding convergent validity were supported and demonstrate moderate to strong evidence that the specific self-efficacy tasks included within the SEADS overlap with measures of similar types of self-efficacy.

Divergent validity was also assessed at the subscale level. All six subscales of the SEADS were compared to the Social Desirability Scale-17 (SDS-17; Stöber, 2001). As hypothesized, there was little to no relationship between the SDS-17 and the six SEADS subscales (Research Self-Efficacy, Clinical Self-Efficacy, Peer Relationship Self-Efficacy, Advisor Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy, and DEI Self-Efficacy). A review of the literature demonstrated that social desirability bias is often neglected as a measure of validity in scale development (King & Bruner, 2000). In research that used SDS-17 as a measure of divergent validity, they also discovered little to no correlation with their measure of self-efficacy (Condom Use Self-Efficacy Scale, Brafford & Beck, 1991; Contraceptive Self-Efficacy Scale, Miller, 2016). The similarity to results on other self-efficacy scales and the lack of relationship between the subscales on the SEADS and a measure of social desirability provide support for our hypothesis of divergent validity and suggests the tendency to respond in a socially desirable manner did not impact the SEADS results.

Internal Consistency

Cronbach's coefficient alpha (1951) is the most common measure of internal consistency and provides evidence that items within subscales are intercorrelated and are measuring the same construct (DeVellis, 2017). It was hypothesized that the Cronbach's alpha for each individual subscale of the SEADS would be above .80. When analyzed as a 107-Item eight-factor structure (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Peer Relationship Self-Efficacy, Clinical Supervisor Relationship Self-Efficacy, Research Writing and Design Self-Efficacy, Statistical Analysis Self-Efficacy, Seeking Support for DEI Self-Efficacy, and Academic Self-Efficacy), actual alpha levels ranged from .788 to .952.

The subscale with the lowest reliability was Academic Self-Efficacy. This was expected due to previous concerns brought up throughout this paper (e.g., hitting the ceiling on self-efficacy, items are too elementary, and restricted range). Other measures of academic self-efficacy have demonstrated higher alpha levels, for example, the Self-Efficacy of Self-Regulated Learning is .87 (Choi et al., 2001), while the College Academic Self-Efficacy Scale has reliability of .90 and .92 (Owen & Froman, 1988). This may suggest that the items for the Academic Self-Efficacy subscale lack unidimensionality (Davenport et al., 2015). Very few of the items loaded on the same factor, and half of the items cross-loaded across several different factors (e.g., research, peer relationship, and clinical self-efficacy), so it is likely the items were not specific or similar enough to capture academic self-efficacy.

The alpha levels for the 76-item, six-factor structure of the SEADS (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy) ranged from .916 and .952, which are excellent. According to DeVellis (1991), we could consider reducing the

number of items to shorten the length of the scale while maintaining high internal consistency. These alpha levels are similar to other measures of self-efficacy, including the SERM (.96), the PTSE (.87), and the Learning Self-Efficacy for Clinical Skills (.931) (Kang et al., 2019). This data suggest evidence that the items on each of the six subscales are related to each other and consistently measure each aspect of HPT doctoral student self-efficacy, indicating good internal consistency (DeVellis, 2017).

Post Hoc Analyses

While we had no specific hypotheses, we wanted to explore if type of professional program (counseling psychology, clinical psychology, school psychology, nursing, physical therapy, and occupational therapy), year in program, gender identity, and racial/ethnic identity showed difference in average levels of the six subscales of the 76-Item SEADS. We also wanted to explore if current self-report of mental health (through the PHQ-8 and GAD-7) were correlated with the subscales.

There were no significant differences in self-efficacy based on field of study, gender identity, or individual racial/ethnic groups. However, there was a significant effect of BIPOC identified individuals on DEI Self-Efficacy. The analyses showed BIPOC identified doctoral students had a significantly higher DEI Self-Efficacy than White doctoral students. Previous studies have found moderate positive correlations between ethnic identity and multicultural self-efficacy in mental health counselors (Matthews et al., 2018) and that racially diverse nurses have higher cultural efficacy working with racially diverse patients (Bernal & Froman, 1993). However, in other studies, demographics variables did not have an effect on DEI self-efficacy (Jeffreys & Dogan, 2012; Miskin et al., 2015). It is crucial to consider how privilege may impact DEI Self-Efficacy. White doctoral students benefit from White privilege and likely spend less

time and energy considering issues of DEI. On the other hand, BIPOC doctoral students likely have more experience confronting issues of DEI in their daily lives, which could increase their DEI Self-Efficacy over time. It also is important to note, the racial groups in the present study were not equal in number (White participants = 253, BIPOC participants = 83) and the BIPOC group combined participants who identified as Asian/Pacific Islander, Black/African American, Hispanic/Latinx, Middle Eastern, Native American/Alaskan Native, and Biracial/Multiracial, so there is no room for nuance among racial/ethnic groups and this may be an overgeneralization.

Graduate students are six times more likely to experience depression and anxiety compared to the general population (Evans et al., 2018). Low self-efficacy is correlated to symptoms of poor psychological functioning in university students, including depression and anxiety (Lavasani et al., 2011). Surprisingly, our post hoc analyses showed symptoms of depression and anxiety were only weakly negatively correlated with five subscales of self-efficacy (< .20) on 76-Item SEADS and not at all correlated with DEI Self-Efficacy. The rates of severity of moderate to severe depression (30.7%) and anxiety (31.9%) of participants in this study are slightly lower than graduate students in other studies, (depression [41%] and anxiety [39%] [Evans et al., 2018]), but much higher than the general population rates of depression (8.4%; NIMH, 2022) and anxiety (6.1%; Zablotsky et al., 2022). It is possible that due to the positive skew of our data and lack of lower range, that the present sample of HPT doctoral students may be handling symptoms of depression and anxiety better than expected. Their higher levels of self-efficacy may mitigate the impact of depression and anxiety symptoms, since self-efficacy has been shown to act as a buffer against stress and burnout (Schmitz, 2000). This result would benefit from further investigation in the CFA.

Limitations

There are several limitations of this study. First, it is important to note that the majority of participants are White (70.9%), Cisgender women (75.3%), and domestic students (85.4%). While this matches the statistics demonstrating most students earning doctoral degrees in the United States are White (89.5%) and domestic (73.1%), this measure may lack generalizability to other cultural identities (American Academy of Arts & Sciences, 2015).

Second, while this study attempted to create a measure for a wide range of HPT doctoral students, much of the sample was psychology, physical therapy, and occupational therapy doctoral students. For the CFA and in future research, a more diverse population in regard to field of study (e.g., nursing, nutrition, and social work) would make the SEADS more useful across healthcare academic programs. Similarly, with larger sample sizes, a CFA that looks at group difference across HPT doctoral students would also be useful.

Third, all self-efficacy measures—including the SEADS—are self-report and contain the limitations of self-report measures. One of the main issues of self-report measures is their tendency to be influenced by social desirability. Participants may be responding due to a need for social acceptance or approval. This may be particularly salient with questions about sensitive issues, such as DEI Self-Efficacy or cultural competence (Larson & Bradshaw, 2017), as they may feel a need to respond positively to statements that are culturally acceptable and negatively to those that are not (Marlowe & Crown, 1961). A meta-analysis found an association between social desirability and multicultural self-efficacy (Larson & Bradshaw, 2017). Our study showed no to little correlation between the six subscales of self-efficacy and social desirability bias. However, future studies should be mindful of participants trying to answer in a culturally acceptable light.

The length of the measure is this study's fourth limitation. The SEADS was cut down from the original 107 items to 76 items but that is still a lengthy measure. Short scales are typically preferred in practice to reduce assessment time and cost (Kemper et al., 2018), but can lead to loss in psychometric quality (Levy, 1968). When considering the future CFA, the length of this survey is likely to produce lower response and completion rates (Kost & da Rosa, 2018).

Fifth, the data reflected a positive skew, particularly with the Academic Self-Efficacy subscale, which reflected as high means and small standard deviations and was dropped in the shorter 76-item version. For the CFA, it may be beneficial to change the current Likert scale measurement (1-5) and expand it to several response options (7 or 10) as it allows for more sensitivity and reliability (Streiner & Norman, 1989) when measuring self-efficacy. Self-efficacy scales with more options are a stronger predictor of performance than those with fewer options (Pajares et al., 2001). This expansion may allow for further discrimination of the strength of self-efficacy and less positive skew.

Implications

The SEADS is grounded in Bandura's Social Cognitive Theory (SCT; Bandura, 1991) which explains how individuals maintain their behavior through reinforcement to achieve goal directed behaviors over long periods of time (Bandura, 1991) and a study from William's (2005) that suggested the three domains making up graduate student self-efficacy: academics, research, and social self-efficacy. DEI Self-Efficacy was added as students in helping professions need skills to address societal problems and engage with others across differences in social identities, values, and beliefs (Perez et al., 2020). This is the core theory guiding self-efficacy and self-efficacy scale development research and is widely used to understand classroom learning, student motivation, and academic achievement (Costlow & Bornstein, 2018). In the context of

HPT doctoral student self-efficacy, SCT would suggest that self-efficacy would increase over time based on performance accomplishments, vicarious experiences, social/verbal persuasion, and emotional and physiological states (Bandura, 1994), the most powerful being mastery or performance accomplishments. With these theoretical considerations in mind, the SEADS likely has several uses related to both research and practice.

Research Implications

Future studies should include a confirmatory factor analysis of the 76-Item SEADS, which will help determine if the psychometric properties of the scale, including factor structure, can be reproduced with a new sample (Brown, 2023). This will also allow for confirmation of the reliability, convergent validity, divergent validity, and test-retest reliability of the scale. When conducting the confirmatory factor analysis, it may be worthwhile to add the Supervisor Working Alliance Scale (Efstation et al., 1990) and or Advisor Working Alliance Inventory (Schlosser & Gelso, 2001) as measures of convergent validity for Advisor Relationship and Clinical Supervisor Relationship Self-Efficacy. Additionally, it is suggested to run the SEADS as oblique factors with significant overlap and utilize Principal Axis Factoring with Direct Oblimin rotation as this will better suit the nonnormality of the data (Costello & Osborne, 2005). The six subscales on the 76-Item SEADS showed more significant correlations than we initially predicted (ranging from .135 to .617). Since the Relational Self-Efficacy items were highly correlated with each other, it may be worth it to consider an alternative factor structure where peer, advisor, and clinical supervisor are one factor. This may create a more robust understanding of how each factor impacts the other and better explain the correlations and variance of the scale.

As it is expected that student self-efficacy will improve over time in the program as HPT doctoral students acquire more knowledge and mastery experiences in successfully completing graduate school skills, we would continue to expect scores on the SEADS to increase depending on time in a HPT doctoral program (Bandura,1997). Future research would benefit from conducting a longitudinal study on self-efficacy across the six subscales of the SEADS (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy) to determine how the scale holds up over a period of time.

As mentioned previously, the SEADS was normed on mostly White cisgender women from psychology, occupational therapy, and physical therapy doctoral programs. Future studies would benefit from a more demographically diverse sample of doctoral students with an emphasis on obtaining more participants from doctoral programs in nursing, dietetics, and social work. Additional studies on the group differences, individual item applicability, and structure of the SEADS for each individual health professions program should be conducted to improve the reliability and validity of the scale. This will also improve the generalizability of the scale to all health profession doctoral programs.

Training Implications

Training wise, the SEADS is a useful instrument for assessing the self-efficacy of HPT doctoral students across a wide variety of graduate school domains. Once the SEADS' psychometric properties are solidified by a confirmatory factor analysis, this tool could provide training directors, advisors, and clinical supervisors valuable information about their students' perceived strengths and weaknesses in graduate school—including points of intervention for students who are struggling.

Many of the fields mentioned in this study (nursing, physical therapy, occupational therapy, psychology) are trying to predict ways to increase self-efficacy amongst their students (Bonsaksen, 2015; van Lankveld et al., 2017; Faramarzi & Khafri, 2017) as it is critical for professional development in health professional students (Hayward et al., 2013). The SEADS could be used as a pre- and post- measure to determine how different interventions, such as a support group or mentoring, do to increase self-efficacy in specific domains. It may also be a useful tool to give to students at the beginning of each year throughout the program as a way for advisors to check in on the current needs of the students. The SEADS could also be used as a self-evaluation tool for programs to determine if there are areas of improvement or interventions on the program's side to help students improve self-efficacy.

Being able to measure overall self-efficacy will allow students and faculty to determine areas in which students (both individually and as a group) need more support and resources, and how to tailor them specifically to the students' needs. Finding ways to increase self-efficacy can be beneficial for students, faculty, universities, and stakeholders as students with higher self-efficacy are less likely to experience burnout and emotional exhaustion (Rigg et al. 2013), high stress levels (Schmitz, 2000), and to persist in the face of difficulty (Linnenbrink & Pintrich, 2002), all of which are factors leading to drop out rates (Ramist, 1981).

Conclusion

Health Profession Trainee (HPT) doctoral students are unique in the multiple roles they are expected to master during graduate school (e.g., student, researcher, clinician, supervisee, advisee, mentor, peer, and more). Self-efficacy is a critical aspect of doctoral student success, as it has been shown to impact academic outcomes (Hsieh et al., 2007; Pintrich & DeGroot, 1990), research productivity (Phillips et al., 1994), clinical functioning (Lent et al., 2003; Larson &

Daniels, 1998), cohort/peer relationships (Jairam & Kahl, 2012), and faculty member relationships (Gardner & Barnes, 2007). The current study addressed the development and initial validation of the Self-Efficacy of Applied Doctoral Students (SEADS), utilizing Social Cognitive Theory and influenced by previous research related to graduate student self-efficacy conducted by Williams (2005). The intent of the SEADS was to better measure HPT doctoral student self-efficacy in all the roles of graduate school, with the hope of improving ways for advisors and programs to assess difficulties and strengths in self-efficacy and intervene as appropriate.

Our pilot study results indicated support for a six-factor structure (Clinical Self-Efficacy, DEI Self-Efficacy, Advisor Relationship Self-Efficacy, Research Self-Efficacy, Peer Relationship Self-Efficacy, and Clinical Supervisor Relationship Self-Efficacy), and confirmed hypotheses related to internal consistency, content validity, and construct validity, especially in regard to the 76-Item SEADS. Post hoc analyses demonstrated no significant differences in self-efficacy based on field of study, gender identity, or individual racial/ethnic groups, but BIPOC individuals showed significantly higher DEI Self-Efficacy compared to White participants. Overall, the result of this study preliminarily establishes the SEADS as a potentially valid and reliable measure. The next step is to conduct a confirmatory study to determine if these properties hold within a new sample.

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Appendix A

107-Item SEADS– Academic, Research, and Clinical Self-Efficacy

Directions: Perceived self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1997, p. 2).

When answering the questions below think of a normative experience in your program, rather than exceptionally difficult or helpful situations.

Rate your degree of confidence in completing the following tasks by recording a number from 1 to 5 using the scale given below:

	Not at all confident	Not very confident	Neutral	Fairly confident	Very confident
ACADEMIC SELF-EFFICACY					
I am confident in my ability to earn the grades I desire in my doctoral level classes.	1	2	3	4	5
I am confident in my ability to perform well on tests in my doctoral program.	1	2	3	4	5
I am confident in my ability to complete the doctoral level homework my professor assigns to me.	1	2	3	4	5
I am confident in my ability to give a doctoral level presentation during class.	1	2	3	4	5
I am confident in my ability to comprehend the doctoral level readings my professors assign to me.	1	2	3	4	5
I am confident in my ability to turn in doctoral level assignments on time.	1	2	3	4	5
I am confident in my ability to write a paper at the doctoral level.	1	2	3	4	5
I am confident in my ability to understand a syllabus for doctoral level classes.	1	2	3	4	5
I am confident in my ability to collaborate with other students on projects in doctoral level classes.	1	2	3	4	5
I am confident in my ability to take useful notes in a doctoral level lecture.	1	2	3	4	5
I am confident in my ability to participate in class discussions at the doctoral level.	1	2	3	4	5
I am confident in my ability to format a paper correctly according to doctoral level expectations.	1	2	3	4	5
RESEARCH SELF-EFFICACY					
I am confident in my ability to come up with a doctoral level research idea.	1	2	3	4	5
I am confident in my ability to form hypotheses about a research topic.	1	2	3	4	5
I am confident in my ability to critique research methodology at the doctoral level.	1	2	3	4	5
I am confident in my ability to choose an appropriate methodology for my doctoral research study.	1	2	3	4	5
I am confident in my ability to recruit participants for a doctoral level research study.	1	2	3	4	5
I am confident in my ability to successfully submit research proposals to the IRB (Institutional Review Board).	1	2	3	4	5

I am confident in my ability to accurately use statistical programs.	1	2	3	4	5
I am confident in my ability to understand doctoral level data analysis.	1	2	3	4	5
I am confident in my ability to accurately analyze quantitative data.	1	2	3	4	5
I am confident in my ability to accurately analyze qualitative data.	1	2	3	4	5
I am confident in my ability to write a literature review that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a methods section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a results section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a discussion section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a manuscript for publication.	1	2	3	4	5
CLINICAL SELF-EFFICACY					
I am confident in my ability to master the skills needed to be successful in my field's doctoral clinical practicum.	1	2	3	4	5
I am confident in my ability to achieve my clinical goals during my field's doctoral clinical practicum.	1	2	3	4	5
I am confident in my ability to show empathy towards my clients/patients.	1	2	3	4	5
I am confident in my ability to successfully implement clinical interventions according to my field's expectations.	1	2	3	4	5
I am confident in my ability to accurately assess a client/patient's problems.	1	2	3	4	5
I am confident in my ability to receive and integrate feedback about my doctoral level clinical work.	1	2	3	4	5
I am confident in my ability to adhere to professional ethics in my work with clients/patients.	1	2	3	4	5
I am confident in my ability to build "good working" relationships with my clients/patients.	1	2	3	4	5
I am confident in my ability to engage in clinical problem solving at my clinical site.	1	2	3	4	5
I am confident in my ability to explain the purpose of each skill/intervention I do to my supervisors/preceptors.	1	2	3	4	5
I am confident in my ability to demonstrate my professional skills/interventions to my supervisors/preceptors.	1	2	3	4	5
I am confident in my ability to adjust skills/interventions to meet the needs of my clients/patients.	1	2	3	4	5
I am confident in my ability to use research/scientific literature to inform my clinical skills/interventions.	1	2	3	4	5
I am confident in my ability to document my client/patient encounters to the standards of my doctoral level clinical practicum site.	1	2	3	4	5
I am confident in my ability to define clinical treatment objectives in specific terms.	1	2	3	4	5

Appendix B

107-Item SEADS– Relationship Self-Efficacy (Peer, Advisor, Clinical Supervisor)

Directions: For the following questions, your advisor and clinical supervisor/preceptor can be from a group or individual setting and can be from a past or current relationship. Try to separate out your sense of skills from who your actual advisor or supervisor is.

Rate your degree of confidence in completing the following tasks by recording a number from 1 to 5 using the scale given below:

	Not at all confident	Not very confident	Neutral	Fairly confident	Very confident
PEER RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to build relationships with peers in my doctoral program.	1	2	3	4	5
I am confident in my ability to communicate my needs with my peers/cohort.	1	2	3	4	5
I am confident in my ability to ask my peers/cohort for advice.	1	2	3	4	5
I am confident in my ability to collaborate with my peers/cohort.	1	2	3	4	5
I am confident in my ability to seek out help from members of my doctoral program.	1	2	3	4	5
I am confident in my ability to seek out support from members of my doctoral program.	1	2	3	4	5
I am confident in my ability to support my peers/cohort.	1	2	3	4	5
I am confident in my ability to confront my peers/cohort about problems.	1	2	3	4	5
I am confident in my ability to solve disagreements between myself and my peers/cohort.	1	2	3	4	5
I am confident in my ability to provide resources/materials for peers in my doctoral program.	1	2	3	4	5
I am confident in my ability to hang out and have fun with peers in my doctoral program.	1	2	3	4	5
I am confident in my ability to talk about program concerns with my peers/cohort.	1	2	3	4	5
ADVISOR RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to communicate my needs to my doctoral advisor.	1	2	3	4	5
I am confident in my ability to get the resources I need from my doctoral advisor.	1	2	3	4	5
I am confident in my ability to schedule and initiate meetings with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to seek help from my doctoral advisor.	1	2	3	4	5
I am confident in my ability to collaborate on research with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to establish a trusting relationship with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to talk about problems with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to ask my doctoral advisor questions.	1	2	3	4	5
I am confident in my ability to self-disclose to my doctoral advisor when necessary.	1	2	3	4	5

I am confident in my ability to have difficult conversations with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to give my doctoral advisor feedback.	1	2	3	4	5
CLINICAL SUPERVISOR RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to ask for the support I need from my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to communicate my needs with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to tell my clinical supervisor/preceptor I do not know the answer.	1	2	3	4	5
I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to ask for resources from my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to discuss my clinical weaknesses with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to self-disclose to my clinical supervisors/preceptor when necessary.	1	2	3	4	5
I am confident in my ability to give my clinical supervisor/preceptor feedback.	1	2	3	4	5
I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor.	1	2	3	4	5

Appendix C

107-Item SEADS– Diversity, Equity, and Inclusion Self-Efficacy

Directions: These questions about confidence are less about other people's ability to respond to something you might say/do and more about your perception of your skills in the area.

For the purposes below, you can use the following definitions of terms:

- **Microaggressions** are the everyday verbal, nonverbal, and environmental slights or insults, whether intentional or unintentional, which communicate derogatory, or negative messages to target persons based solely upon their marginalized group membership (Sue, 2010).
- **Marginalized identities** are groups and communities that experience discrimination and exclusion [social, political, and economic] because of unequal power relationships across economic, political, social, and cultural dimensions (National Collaborating Centre for Determinants of Health, 2022).
- **Unconscious biases** are social stereotypes about certain groups of people that individuals form outside their own conscious awareness. Everyone holds unconscious beliefs about various social and identity groups, and these biases stem from one's tendency to organize social worlds by categorizing (UCSF, 2022).

Rate your degree of confidence in completing the following tasks by recording a number from 1 to 5 using the scale given below:

	Not at all confident	Not very confident	Neutral	Fairly confident	Very confident
I am confident in my ability to express my identities safely within a doctoral program environment.	1	2	3	4	5
I am confident in my ability to receive the same treatment as other members in a doctoral program environment.	1	2	3	4	5
I am confident in my ability to openly share about my culture within a doctoral program environment.	1	2	3	4	5
I am confident in my ability to receive support in a doctoral program environment if I am being discriminated against.	1	2	3	4	5
I am confident in my ability to ask for help in a doctoral program environment when I experience oppression/discrimination.	1	2	3	4	5
I am confident in my ability to seek out support in a doctoral program environment when I experience oppression/discrimination.	1	2	3	4	5
I am confident in my ability to address issues of (racism/sexism/homophobia/etc.) in a doctoral program environment without getting nervous.	1	2	3	4	5
I am confident in my ability to accept and implement feedback about my multicultural competency.	1	2	3	4	5
I am confident in my ability to notice and address a microaggression I have made.	1	2	3	4	5
I am confident in my ability to discuss concerns about diversity, equity, and inclusion within a doctoral program.	1	2	3	4	5
I am confident in my ability to provide feedback to a doctoral program about issues of diversity, equity, and inclusion.	1	2	3	4	5

I am confident in my ability to contribute to creating a safe environment for people of all identities in my program.	1	2	3	4	5
I am confident in my ability to critique articles in doctoral level classes for issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to discuss issues of diversity, equity, and inclusion in my field in a doctoral level class discussion.	1	2	3	4	5
I am confident in my ability to identify issues of diversity, equity, and inclusion in presentations I give in doctoral level class.	1	2	3	4	5
I am confident in my ability to critique research for issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to form a research study that takes into consideration marginalized identities.	1	2	3	4	5
I am confident in my ability to recruit participants in a way that accounts for inclusion of marginalized identities.	1	2	3	4	5
I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients.	1	2	3	4	5
I am confident in my ability to discuss issues of diversity, equity, and inclusion concerns with my clients/patients.	1	2	3	4	5
I am confident in my ability to solve ethical problems in relation to diversity, equity, and inclusion of my clients/patients.	1	2	3	4	5
I am confident in my ability to be aware of how my unconscious biases impact client/patient care.	1	2	3	4	5
I am confident in my ability to address microaggressions with my peers/cohort.	1	2	3	4	5
I am confident in my ability to provide support around issues of diversity, equity, and inclusion to my peers/cohort.	1	2	3	4	5
I am confident in my ability to be myself around members of my program.	1	2	3	4	5
I am confident in my ability to seek support from my doctoral advisor following a microaggression.	1	2	3	4	5
I am confident in my ability to provide my advisor feedback about issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to accept feedback about my multicultural competency from my doctoral advisor.	1	2	3	4	5
I am confident in my ability to explore client/patient concerns of diversity, equity, and inclusion with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to ask for resources from my clinical supervisor/preceptor on behalf of my marginalized clients/patients.	1	2	3	4	5
I am confident in my ability to explore my unconscious biases with my clinical supervisor/preceptor.	1	2	3	4	5

Appendix D

76-Item SEADS– Clinical, DEI, Advisor, Research, Peer, and Clinical Supervisor Self-Efficacy

Directions: Rate your degree of confidence in completing the following tasks by recording a number from 1 to 5 using the scale given below:

	Not at all confident	Not very confident	Neutral	Fairly confident	Very confident
CLINICAL SELF-EFFICACY					
I am confident in my ability to master the skills needed to be successful in my field's doctoral clinical practicum.	1	2	3	4	5
I am confident in my ability to achieve my clinical goals during my field's doctoral clinical practicum.	1	2	3	4	5
I am confident in my ability to show empathy towards my clients/patients.	1	2	3	4	5
I am confident in my ability to successfully implement clinical interventions according to my field's expectations.	1	2	3	4	5
I am confident in my ability to accurately assess a client/patient's problems.	1	2	3	4	5
I am confident in my ability to receive and integrate feedback about my doctoral level clinical work.	1	2	3	4	5
I am confident in my ability to adhere to professional ethics in my work with clients/patients.	1	2	3	4	5
I am confident in my ability to build "good working" relationships with my clients/patients.	1	2	3	4	5
I am confident in my ability to engage in clinical problem solving at my clinical site.	1	2	3	4	5
I am confident in my ability to explain the purpose of each skill/intervention I do to my supervisors/preceptors.	1	2	3	4	5
I am confident in my ability to demonstrate my professional skills/interventions to my supervisors/preceptors.	1	2	3	4	5
I am confident in my ability to adjust skills/interventions to meet the needs of my clients/patients.	1	2	3	4	5
I am confident in my ability to use research/scientific literature to inform my clinical skills/interventions.	1	2	3	4	5
I am confident in my ability to document my client/patient encounters to the standards of my doctoral level clinical practicum site.	1	2	3	4	5
I am confident in my ability to define clinical treatment objectives in specific terms.	1	2	3	4	5
DEI SELF-EFFICACY					
I am confident in my ability to accept and implement feedback about my multicultural competency.	1	2	3	4	5
I am confident in my ability to notice and address a microaggression I have made.	1	2	3	4	5
I am confident in my ability to discuss concerns about diversity, equity, and inclusion within a doctoral program.	1	2	3	4	5
I am confident in my ability to provide feedback to a doctoral program about issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to contribute to creating a safe environment for people of all identities in my program.	1	2	3	4	5
I am confident in my ability to critique articles in doctoral level classes for issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to discuss issues of diversity, equity, and inclusion in my field in a doctoral level class discussion.	1	2	3	4	5

I am confident in my ability to identify issues of diversity, equity, and inclusion in presentations I give in doctoral level class.	1	2	3	4	5
I am confident in my ability to critique research for issues of diversity, equity, and inclusion.	1	2	3	4	5
I am confident in my ability to form a research study that takes into consideration marginalized identities.	1	2	3	4	5
I am confident in my ability to recruit participants in a way that accounts for inclusion of marginalized identities.	1	2	3	4	5
I am confident in my ability to discuss issues of diversity, equity, and inclusion concerns with my clients/patients.	1	2	3	4	5
I am confident in my ability to solve ethical problems in relation to diversity, equity, and inclusion of my clients/patients.	1	2	3	4	5
I am confident in my ability to be aware of how my unconscious biases impact client/patient care.	1	2	3	4	5
I am confident in my ability to address microaggressions with my peers/cohort.	1	2	3	4	5
I am confident in my ability to provide support around issues of diversity, equity, and inclusion to my peers/cohort.	1	2	3	4	5
ADVISOR RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to communicate my needs to my doctoral advisor.	1	2	3	4	5
I am confident in my ability to get the resources I need from my doctoral advisor.	1	2	3	4	5
I am confident in my ability to schedule and initiate meetings with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to seek help from my doctoral advisor.	1	2	3	4	5
I am confident in my ability to collaborate on research with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to establish a trusting relationship with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to talk about problems with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to ask my doctoral advisor questions.	1	2	3	4	5
I am confident in my ability to self-disclose to my doctoral advisor when necessary.	1	2	3	4	5
I am confident in my ability to have difficult conversations with my doctoral advisor.	1	2	3	4	5
I am confident in my ability to give my doctoral advisor feedback.	1	2	3	4	5
I am confident in my ability to seek support from my doctoral advisor following a microaggression.	1	2	3	4	5
RESEARCH SELF-EFFICACY					
I am confident in my ability to come up with a doctoral level research idea.	1	2	3	4	5
I am confident in my ability to form hypotheses about a research topic.	1	2	3	4	5
I am confident in my ability to critique research methodology at the doctoral level.	1	2	3	4	5
I am confident in my ability to choose an appropriate methodology for my doctoral research study.	1	2	3	4	5
I am confident in my ability to recruit participants for a doctoral level research study.	1	2	3	4	5
I am confident in my ability to successfully submit research proposals to the IRB (Institutional Review Board).	1	2	3	4	5

I am confident in my ability to accurately use statistical programs.	1	2	3	4	5
I am confident in my ability to understand doctoral level data analysis.	1	2	3	4	5
I am confident in my ability to accurately analyze quantitative data.	1	2	3	4	5
I am confident in my ability to accurately analyze qualitative data.	1	2	3	4	5
I am confident in my ability to write a literature review that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a methods section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a results section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a discussion section that meets doctoral level expectations.	1	2	3	4	5
I am confident in my ability to write a manuscript for publication.	1	2	3	4	5
PEER RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to build relationships with peers in my doctoral program.	1	2	3	4	5
I am confident in my ability to communicate my needs with my peers/cohort.	1	2	3	4	5
I am confident in my ability to ask my peers/cohort for advice.	1	2	3	4	5
I am confident in my ability to collaborate with my peers/cohort.	1	2	3	4	5
I am confident in my ability to seek out help from members of my doctoral program.	1	2	3	4	5
I am confident in my ability to seek out support from members of my doctoral program.	1	2	3	4	5
I am confident in my ability to support my peers/cohort.	1	2	3	4	5
I am confident in my ability to solve disagreements between myself and my peers/cohort.	1	2	3	4	5
I am confident in my ability to hang out and have fun with peers in my doctoral program.	1	2	3	4	5
I am confident in my ability to talk about program concerns with my peers/cohort.	1	2	3	4	5
I am confident in my ability to be myself around members of my program.	1	2	3	4	5
CLINICAL SUPERVISOR RELATIONSHIP SELF-EFFICACY					
I am confident in my ability to ask for the support I need from my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to communicate my needs with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to tell my clinical supervisor/preceptor I do not know the answer.	1	2	3	4	5
I am confident in my ability to ask for resources from my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to discuss my clinical weaknesses with my clinical supervisor/preceptor.	1	2	3	4	5
I am confident in my ability to self-disclose to my clinical supervisors/preceptor when necessary.	1	2	3	4	5
I am confident in my ability to give my clinical supervisor/preceptor feedback.	1	2	3	4	5

Appendix E

Discarded Items from the Original 107-Item SEADS (Factor Loading)

Academic Self Efficacy:
I am confident in my ability to earn the grades I desire in my doctoral level classes (.76)
I am confident in my ability to perform well on tests in my doctoral program. (.73)
I am confident in my ability to complete the doctoral level homework my professor assigns to me. (.40)
I am confident in my ability to give a doctoral level presentation during class. (.32)
I am confident in my ability to comprehend the doctoral level readings my professors assign to me. (.30)
I am confident in my ability to turn in doctoral level assignments on time. (.30)
I am confident in my ability to write a paper at the doctoral level. (.40)
I am confident in my ability to understand a syllabus for doctoral level classes. (.30)
I am confident in my ability to collaborate with other students on projects in doctoral level classes. (.46)
I am confident in my ability to take useful notes in a doctoral level lecture. (.40)
I am confident in my ability to participate in class discussions at the doctoral level. (.28)
I am confident in my ability to format a paper correctly according to doctoral level expectations. (.45)

DEI Self-Efficacy:
I am confident in my ability to express my identities safely within a doctoral program environment. (.64)
I am confident in my ability to receive the same treatment as other members in a doctoral program environment. (.55)
I am confident in my ability to openly share about my culture within a doctoral program environment. (.57)
I am confident in my ability to receive support in a doctoral program environment if I am being discriminated against. (.74)
I am confident in my ability to ask for help in a doctoral program environment when I experience oppression/discrimination. (.85)
I am confident in my ability to seek out support in a doctoral program environment when I experience oppression/discrimination. (.86)
I am confident in my ability to address issues of (racism/sexism/homophobia/etc.) in a doctoral program environment without getting nervous. (.36)
I am confident in my ability to adapt treatments to meet the needs of my marginalized clients/patients. (.50)
I am confident in my ability to provide my advisor feedback about issues of diversity, equity, and inclusion. (.46)
I am confident in my ability to accept feedback about my multicultural competency from my doctoral advisor. (.47)
I am confident in my ability to explore client/patient concerns of diversity, equity, and inclusion with my clinical supervisor/preceptor. (.59)
I am confident in my ability to ask for resources from my clinical supervisor/preceptor on behalf of my marginalized clients/patients. (.70)
I am confident in my ability to explore my unconscious biases with my clinical supervisor/preceptor. (.59)

Peer Relationship Self-Efficacy
I am confident in my ability to confront my peers/cohort about problems. (.39)
I am confident in my ability to provide resources/materials for peers in my doctoral program. (.37)

Clinical Supervisor Relationship Self-Efficacy
I am confident in my ability to walk through a clinical case with my clinical supervisor/preceptor. (.54)
I am confident in my ability to discuss my clinical strengths with my clinical supervisor/preceptor. (.49)
I am confident in my ability to collaborate on a clinical case with my clinical supervisor/preceptor. (.45)
I am confident in my ability to engage in treatment planning with my clinical supervisor/preceptor. (.51)

Appendix F

New General Self-Efficacy Scale (Chen et al., 2001)

Directions: General self-efficacy relates to "one's estimate of one's overall ability to perform successfully in a wide variety of achievement situations, or to how confident one is that she or he can perform effectively across different tasks and situations," and (b) self-esteem relates to "the overall affective evaluation of one's own worth, value, or importance, or to how one feels about oneself as a person." Please circle your answer below:

Items	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
I will be able to achieve most of the goals that I set for myself.	1	2	3	4	5
When facing difficult tasks, I am certain that I will accomplish them.	1	2	3	4	5
In general, I think that I can obtain outcomes that are important to me.	1	2	3	4	5
I believe I can succeed at most any endeavor to which I set my mind.	1	2	3	4	5
I will be able to successfully overcome many challenges.	1	2	3	4	5
I am confident that I can perform effectively on many different tasks.	1	2	3	4	5
Compared to other people, I can do most tasks very well.	1	2	3	4	5
Even when things are tough, I can perform quite well.	1	2	3	4	5

Appendix G

Self-Efficacy for Self-Regulated Learning subscale of the Multidimensional Scales of Perceived Self-Efficacy (Bandura, 1989; Bandura, 2006)

This questionnaire is designed to help us get a better understanding of the kinds of things that are difficult for students. Please rate how certain you are that you can do each of the things described below by writing the appropriate number. Your answers will be kept strictly confidential and will not be identified by name.

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:

Items	0 Cannot do at all	10	20	30	40	50 Moderately can do	60	70	80	90	100 Highly certain can do
Finish my homework assignments by deadlines	0	10	20	30	40	50	60	70	80	90	100
Get myself to study when there are other interesting things to do	0	10	20	30	40	50	60	70	80	90	100
Always concentrate on school subjects during class	0	10	20	30	40	50	60	70	80	90	100
Take good notes during class instruction	0	10	20	30	40	50	60	70	80	90	100
Use the library to get information for class assignments	0	10	20	30	40	50	60	70	80	90	100
Plan my schoolwork for the day	0	10	20	30	40	50	60	70	80	90	100
Organize my schoolwork	0	10	20	30	40	50	60	70	80	90	100
Remember information presented in class and textbooks	0	10	20	30	40	50	60	70	80	90	100
Arrange a place to study without distractions	0	10	20	30	40	50	60	70	80	90	100
Get myself to do schoolwork	0	10	20	30	40	50	60	70	80	90	100

Appendix H

Self-Efficacy of Research Measure—Brief Version (Phillips & Russell, 1994; Kahn & Scott, 1997)

The following items are tasks related to research. Please indicate your degree of confidence in your ability to successfully accomplish each of the following tasks on a scale of 0 – 9 with 0 representing no confidence and 9 representing total confidence.

Items	1 No Confidence	2	3	4	5	6	7	8	9 Total Confidence
1. Keeping records during a research project	1	2	3	4	5	6	7	8	9
2. Designing an experiment using traditional methods (e.g., experimental, quasi-experimental designs, qualitative)	1	2	3	4	5	6	7	8	9
3. Writing the introduction and literature review for a dissertation	1	2	3	4	5	6	7	8	9
4. Writing the introduction and discussion sections for a research paper for publication	1	2	3	4	5	6	7	8	9
5. Formulating hypotheses	1	2	3	4	5	6	7	8	9
6. Writing the method and results sections of a thesis	1	2	3	4	5	6	7	8	9
7. Utilizing resources for needed help	1	2	3	4	5	6	7	8	9
8. Understanding computer research programs (e.g., SPSS, SAS, ATLAS.ti, R, etc.)	1	2	3	4	5	6	7	8	9
9. Defending a thesis or dissertation	1	2	3	4	5	6	7	8	9
10. Using multivariate statistics (e.g., multiple regression, factor analysis, etc.)	1	2	3	4	5	6	7	8	9
11. Using statistical packages (e.g., SPSS, SAS, ATLAS.ti, R, etc.)	1	2	3	4	5	6	7	8	9
12. Operationalizing variables of interest	1	2	3	4	5	6	7	8	9

Appendix I

Physical Therapy Self-Efficacy Scale (Venskus & Craig 2017)

Please answer the following questions:

Items	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
1. I am confident I know how to assess the clinical issues being presented by the patient/client in my clinical practice.	1	2	3	4	5
2. I will know when it is time to refer a patient/client problem to another practitioner.	1	2	3	4	5
3. In my clinical practicum, I am confident in my ability to make diagnostic decisions about a patient/client.	1	2	3	4	5
4. I believe that I can manage general clinical problems that a patient/client presents with.	1	2	3	4	5
5. In my clinical practicum, when facing a difficult case, I am certain I can make the right treatment decisions.	1	2	3	4	5

Appendix J

Multidimensional Scale of Perceived Social Support (Zimet et al., 1988)

Directions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
Circle the "2" if you **Strongly Disagree**
Circle the "3" if you **Mildly Disagree**
Circle the "4" if you are **Neutral**
Circle the "5" if you **Mildly Agree**
Circle the "6" if you **Strongly Agree**
Circle the "7" if you **Very Strongly Agree**

1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7	SO
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	SO
3.	My family really tries to help me.	1	2	3	4	5	6	7	Fam
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7	Fam
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7	SO
6.	My friends really try to help me.	1	2	3	4	5	6	7	Fri
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7	Fri
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7	Fam
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	Fri
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7	SO
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7	Fam
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7	Fri

Appendix K

Openness to Diversity Scale (Pascarella et al., 1996)

General Instructions: Circle the number that indicates the extent to which you agree/disagree with each of the following statements about your views or perspectives in general. There is neither a right nor wrong answer to any question. Please do your best to provide complete information. However, if you cannot respond to an item, feel free to leave the response blank. Your identity and responses will be held in strict confidence.

Items	Strongly Disagree	Disagree	In-Between	Agree	Strongly Agree
1. I enjoy having discussions with people whose ideas and values are different from my own.	1	2	3	4	5
2. The real value of a college education lies in being introduced to different values.	1	2	3	4	5
3. I enjoy talking to people who have values different from my mine because it helps me understand myself and my values better.	1	2	3	4	5
4. Learning about people from different cultures is a very important part of my college education.	1	2	3	4	5
5. I enjoy taking courses that challenge my beliefs and values.	1	2	3	4	5
6. The courses I enjoy the most are those that make me think about things from a different perspective.	1	2	3	4	5
7. Contact with individuals whose background (e.g. race, national origin, sexual orientation) is different from my own is an essential part of my college education.	1	2	3	4	5
8. I enjoy courses that are intellectually challenging.	1	2	3	4	5

Appendix L

Social Desirability Scale-17 (Stöber, 2001)

Below you will find a list of statements. Please read each statement carefully and decide if that statement describes you or not. If it describes you, check the word "true"; if not, check the word "false".

1. I sometimes litter.
2. I always admit my mistakes openly and face the potential negative consequences.
3. In traffic I am always polite and considerate of others.
4. I have tried illegal drugs (for example, marijuana, cocaine, etc.).
5. I always accept others' opinions, even when they don't agree with my own.
6. I take out my bad moods on others now and then.
7. There has been an occasion when I took advantage of someone else.
8. In conversations I always listen attentively and let others finish their sentences.
9. I never hesitate to help someone in case of emergency.
10. When I have made a promise, I keep it--no ifs, ands or buts.
11. I occasionally speak badly of others behind their back.
12. I would never live off other people.
13. I always stay friendly and courteous with other people, even when I am stressed out.
14. During arguments I always stay objective and matter of fact.
15. There has been at least one occasion when I failed to return an item that I borrowed.
16. I always eat a healthy diet.
17. Sometimes I only help because I expect something in return.

Answer categories are *"true" (1) and "false" (0)*. Items 1, 4, 6, 7, 11, 15, and 17 are reverse keyed.