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Original Research

National Study Examining Excellence and Value in Physical Therapist Residency Education: Part 1—Design, Methods, and Results

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Abstract

Objective. A challenge in health professions is training practitioners to navigate health care complexities, promote health, optimize outcomes, and advance their field. Physical therapist residency education offers a pathway to meet these needs in ways that "entry-level" (professional) education may not. Identifying key aspects of excellence in residency education and understanding its value in developing adaptive expertise will help devise strategies to enhance program, resident, and patient outcomes. The objective of this study was to examine current physical therapist residency education practices to identify and describe examples of excellence and value.

Methods. A multi-site, multi-specialty qualitative case series was conducted, examining exemplary physical therapist residency programs and their contextual environments using a social constructivist theoretical lens. Six residency programs operating 20 individual residencies that were considered exemplar were selected for the study to participate in site visits. Qualitative case studies were generated from individual interviews, focus groups, review of artifacts, and field observations. The residencies were diverse in specialty area of practice, setting, and geographic location.

Results. A conceptual framework was generated grounded in the domains of excellence and value. These domains were connected by 3 signature indicators: (1) atmosphere of practice-based learning, (2) embodiment of professional formation, and (3) elevated practice. These signature indicators represent the aggregate effects of the interchange between the excellence and value domains which sustain residency education.

Conclusion. This study builds upon the work of the Physical Therapist Education for the 21st Century (PTE-21) study and identifies key elements of excellence in residency education, the value of such education, and related outcomes. Findings from this study substantiate the need for a postprofessional phase of physical therapist education founded in practice-based learning encapsulated in residency education.

Impact. Results from this study could have compelling and powerful implications on the dialogue and strategic direction in physical therapist residency education.

Keywords: Adaptive Expertise, Education: Postprofessional, Excellence, Master Adaptive Learning, Organizational Culture, Practice-Based Learning, Professional Formation, Residency, Value, Workforce

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Introduction

A significant challenge across the health professions, including physical therapy, is the development of practitioners who can navigate the current and future complexities of the health care system, champion health promotion, achieve optimal patient outcomes, and act in ways that advance the profession.[1–5] Residency education offers a pathway to meet these needs in ways that "entry-level" (professional) education may not.[4,6–8] Evidence of the value, outcomes, and influence related to postprofessional physical therapist residency education (PT-ResEd) has emerged,[2,9–13] but more robust evidence is needed to justify postprofessional education in the physical therapy profession.

Evidence suggests that completing a physical therapist residency may positively impact self-perceived clinical skills,[2,9,13] influence pursuit of further training,[9–11] influence job responsibilities and career satisfaction,[12,13] and promote professional behaviors.[2] Briggs et al[2] showed that employers' perceived residency trained employees to function at higher levels in the domains of clinical aptitude, communication, and leadership compared to experience-matched non-residency trained employees. There is also evidence of value, outcomes, and influence of PT-ResEd collectively supporting a positive effect particularly on learner outcomes.[2,9–12]

Findings from these studies consist primarily of survey results, are largely based on single programs or one specialty area of practice, are often based on self-report, have a high potential for bias, and lack robust comparisons.[2,9–11,13] Additionally, we still do not know the alignment of PT-ResEd with recommendations from the Physical Therapist Education for the 21st Century (PTE-21) study, where PT-ResEd was a key component for developing a continuum of performance expectations grounded in competencies and central to facilitating a robust community of practice for all learners.[14,15] Identifying and understanding how elements of excellence are embedded in all phases—professional and postprofessional—of physical therapist education may help to identify high-quality residency programs and understand what contributes to excellence in these programs as we uncover the perceived value of PT-ResEd across stakeholders.

There is question as to whether professional ("entry-level") education is sufficient preparation for physical therapists in fulfilling roles and obligations to patients and society.[6] PT-ResEd offers a more standardized and externally recognized path to advanced specialty care rather than traditional continuing education. Further, numerous leaders in the profession have echoed a concern that the profession has reached a critical point in the evolution of residency education.[4,6,16,17] As we continue to create more residencies with wide variability in their characteristics,[18,19] we have little to guide us toward defining what is perceived as excellence. Furthermore, to be sustainable, we must demonstrate high value to society through access to quality specialty care that is cost effective.[1,4,19,20] Growth in the number of residencies for the sake of improving availability will not advance the profession.[21] Identifying elements of excellence in PT-ResEd and establishing a foundation for understanding the current value of PT-ResEd in facilitating learning and lifelong development of adaptive expertise will help identify strategies to maximize program, resident, and patient outcomes.

The purpose of this research was threefold: (1) examine current PT-ResEd practices to identify and describe examples of excellence and their alignment with the PTE-21 model[14,15,22,23]; (2) explore, identify, and fully describe the perceived value of PT-ResEd from a multi-stakeholder perspective; and (3) identify elements of excellence that may be used to advance high impact PT-ResEd. It is recommended that the reader review PTE-21 model study and model to provide additional context for the current project.[14,15,22,23]

Methods

Research Design

We used a social constructivist theoretical lens in conducting a multi-site, multi-specialty qualitative case series that examined exemplary physical therapist residency programs and the contextual environments in which they operate.[24,25] We used the conceptual framework from the PTE-21 study to initially guide our investigation.[14,22,23] In this study, we define a residency program as the entity providing administrative oversight for all individual residencies (eg, orthopedic, neurologic) operating within a sponsoring organization. The administrative entity may oversee one or more individual residencies. Some residency programs may have had oversight by multiple organizations, (eg, a clinic and/or hospital and an academic institution). To be considered for the study, residency programs needed to: (1) be American Board of Physical Therapy Residency and Fellowship Education (ABPTRFE) accredited and (2) operate within an organizational structure that was responsible for day-to-day activities, the education outcomes, and financial oversight.

All procedures for this study were reviewed and determined exempt by The Ohio State University Internal Review Board (IRB) (2021E0872). All participants provided their informed consent.

Recruitment and Sample Selection

Participants were recruited through a national call and self-nomination process that consisted of three phases (Fig. 1). In the first phase, we distributed a recruitment email to all individual residency contacts from the ABPTRFE directory of accredited residencies.[19] Respondents interested in participating in the study were asked to provide contact information for the individual(s) with administrative responsibility for their residency.

In phase two, an email was sent to individuals identified in phase one. The email explained the purpose of the study and invited participation by completing a screening survey (Suppl. Appendix A). The screening survey was based on an *a priori* selection criteria (Fig. 1 and Suppl. Appendix B) developed in consultation with an advisory panel of stakeholders and leaders within the physical therapy profession who have professional and postprofessional education experience (eg, VP of Education, APTA; Director, Residency/Fellowship Accreditation, APTA; and Executive VP, APTA). Selection criteria development was initially informed by the Carnegie criteria, academic site selection criteria, and clinical site selection criteria (see Table 2 in Jensen et al 2017[14]) from the PTE-21 study. These criteria were adapted to PT-ResEd and additional criteria were based on input from the advisory panel and study team. For the third phase, the study team reviewed and scored the screening survey responses for each residency program using a rubric that was developed in collaboration with the advisory panel and based on the selection criteria (Fig. 1 and

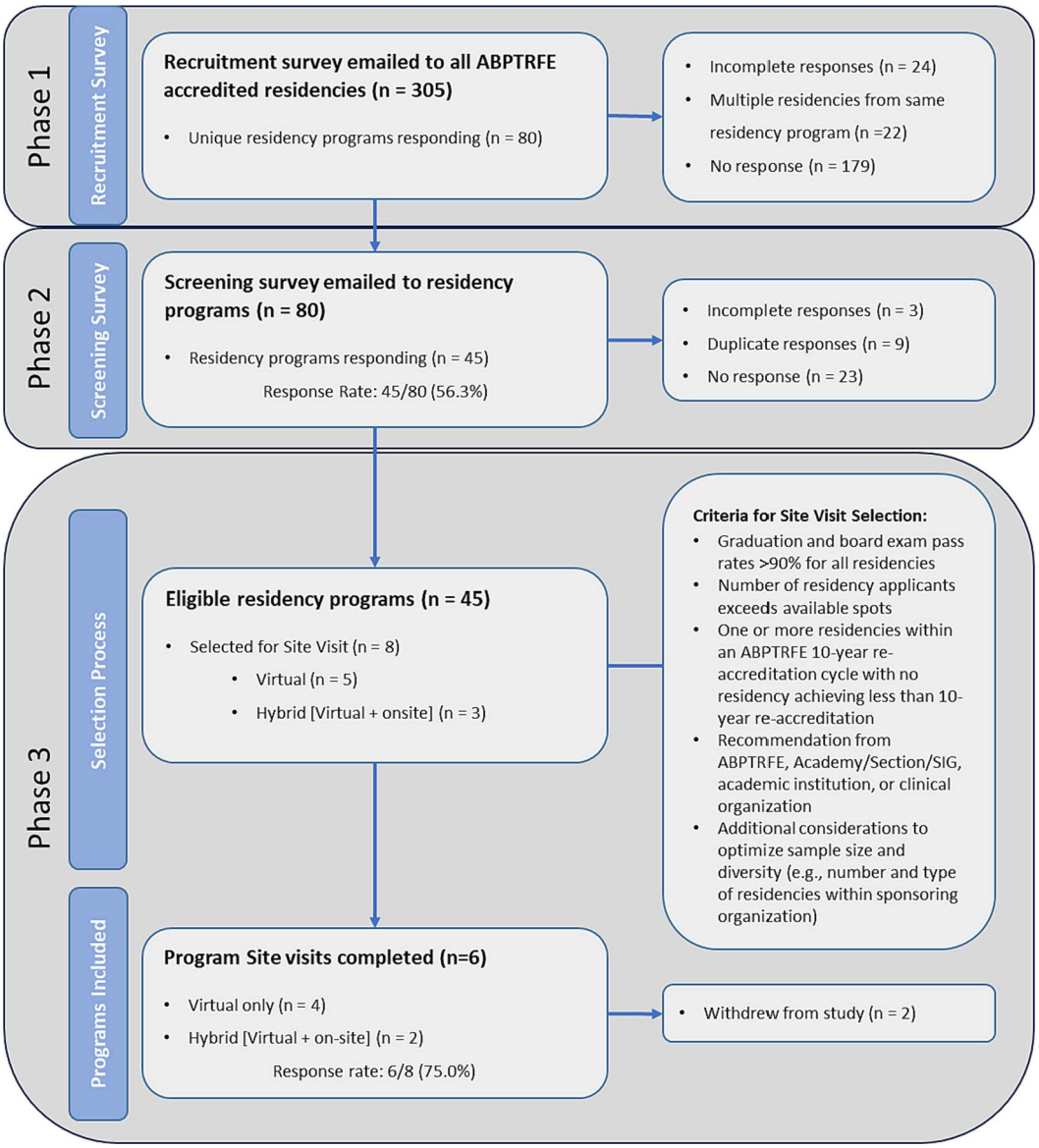

Figure 1. Flow diagram of recruitment and selection process. Residency programs represent the administrative structure under which one or more individual residencies (eg, orthopedics, neurology, pediatrics) operate. ABPTRFE = American Board of Physical Therapy Residency and Fellowship Education; SIG = Special Interest Group.

Suppl. Appendix B). Participating residency programs were ranked by score and selected for inclusion after the study team insured that we had a representative sample of programs to cover differences in residency program size, geographic location, specialty area, and type of sponsoring organization (Suppl. Appendix B) in an effort to optimize the size and diversity of the sample that would most likely demonstrate elements of excellence (defined by Jensen et al.[14]).

Procedures and Data Collection

Data collection was initially delayed by the COVID-19 pandemic and occurred over a 3-year period (Fig. 1). Initial plans to conduct on-site visits with selected residency programs had to be modified due to COVID-19 restrictions. However, the use of technology elevated the opportunity to increase our sample size by conducting virtual site visits with additional residency programs that ranked highly on our rubric. Thus, programs either received virtual or hybrid (combined virtual and in-person) site visits. During the in-person site visits, we conducted semi-structured interviews, focus groups, artifact review, and collection of field notes. Virtual site visits only included virtual interviews, focus groups, and artifact review.

- Virtual and On-Site Semi-structured Interviews and Focus Groups: Thirty-to-sixty-minute, semi-structured interviews were conducted with stakeholders of the residency programs (program director(s), faculty members, residents, residency graduates, and administrative representative(s) from the sponsoring organization) (Table 1). All virtual interviews and focus groups used a script, were audio recorded, and transcribed verbatim by virtual software (Zoom, San Jose, CA). Initially, interview guides were developed based on the PTE-21 study.[14,22,23] These interview guides (Suppl. Appendix C) were then refined based on themes that emerged from the semi-structured interviews and focus groups. Each of the interview transcripts were independently coded

Table 1. Program Demographics

Study Site ID #	Criteria Score	Virtual or Hybrid Site Visits	Residency/ Org Designation	Roles Interviewed[a] (#)	Residency Type	Region(s)
REV046	12	Virtual	Clinical (government operated)	Administration (2), Residency Directors/Coordinators (4), Faculty (5), Current Residents (6), Residency Graduates (5)	Cardiovascular and Pulmonary Geriatrics Neurology Orthopedics	New England (CT, ME, MA, NH, RI, VT); South Atlantic (DE, DC, FL, GA, MD, NC, PR, SC, VA, WVA); East North Central (IL, IN, MI, OH, WI); East South Central (AL, KY, MS, TN); West North Central (IA, KS, MN, MO, NE, ND, SD); Mountain (AZ, CO, ID, MT, NV, NM, UT, WY); Pacific (AK, CA, HI, OR, WA)
REV035	13.5	Hybrid	Clinical (not-for-profit)	Administration (1), Residency Directors/Coordinators (3), Faculty (3), Current Residents (3), Residency Graduates (2), Patients (2)	Acute Care Geriatrics Neurology Orthopedics Pediatrics Sports	South Atlantic (DE, DC, FL, GA, MD, NC, PR, SC, VA, WVA)
REV040	13.5	Hybrid	Academic (private)	Administration (2), Residency Directors/Coordinators (5), Faculty (4), Current Residents (3), Residency Graduates (5)	Neurology Orthopedics Pediatrics Sports	Pacific (AK, CA, HI, OR, WA)
REV027	16.5	Virtual	Non-clinical (for profit)	Administration (3), Residency Directors/Coordinators (1), Faculty (3), Current Residents (4), Residency Graduates (2)	Orthopedics	East North Central (IL, IN, MI, OH, WI); West North Central (IA, KS, MN, MO, NE, ND, SD)
REV042	17	Virtual	Academic (public)	Administration (2), Residency Directors/Coordinators (4), Faculty (4), Current Residents (4), Residency Graduates (4)	Orthopedics Sports	East North Central (IL, IN, MI, OH, WI)
REV012	19.5	Virtual	Clinical (not-for-profit)	Administration (1), Residency Directors/Coordinators (3), Faculty (4), Current Residents (3), Residency Graduates (3)	Acute Care Orthopedics Sports	West South Central (AR, LA, OK, TX)

[a]Faculty is inclusive of academic and clinical faculty/mentors.

by the study team members using the core concepts from the interview guide and an open coding process. Preliminary coding categories included elements of excellence (organizational mission, learning environment, leadership) and elements of value (partnerships, culture of growth, societal focus). These preliminary coding categories served as the structure for the descriptive case reports. This shared outline structure for the case reports was used for further data reduction and analysis done through team discussion and deliberation as described below. A focus group with patients during one of the on-site visits was also conducted.

- Review of Artifacts and Field Notes: The study team collected and reviewed selected curricular documents reflecting the mission, goals, and methods for assessing outcomes of all the included residency program. For the on-site visits, the study team took field notes describing elements in the clinical learning environment and observations of interactions. Data from these artifacts and notes were themed similarly to data from the interviews and focus groups.

Data Reduction and Analysis

Similar to the PTE-21 study,[14,22,23] we used an iterative process of axial coding as emerging themes were visible in the cross-case analysis. Excellence and value remained primary constructs (domains) with a similar theme of strong alignment across residents, programs, and sponsoring organizations. Further within-case and cross-case analysis allowed us to continue to revise and refine our working conceptual framework.[26,27] Monthly to quarterly virtual meetings were held by the research team throughout the study as part of the ongoing data reduction and analysis. The interviews and focus groups were transcribed, and an iterative process of both open and axial coding and a constant comparison approach was applied to data reduction and thematic saturation.[27,28] Structured case reports for each included residency program were created by two members of the team that conducted the site visit (Suppl. Appendix D). A third member of the study team was responsible for a thorough review to affirm or reject any portion of the case report based on participation in the site visit and review of the transcripts.[14] The study team used the resulting case reports to perform a thematic analysis using an interpretive, constant comparative approach where common elements of excellence and value emerged. The research team also identified evidence to support emergent themes such as a shared learning and patient care mission that were core elements of the residency programs. Cross-case analysis and analytic strategies of pattern matching and explanation building were used to examine alignment of findings with the PTE-21 model.[14,25,29] This was done through a series

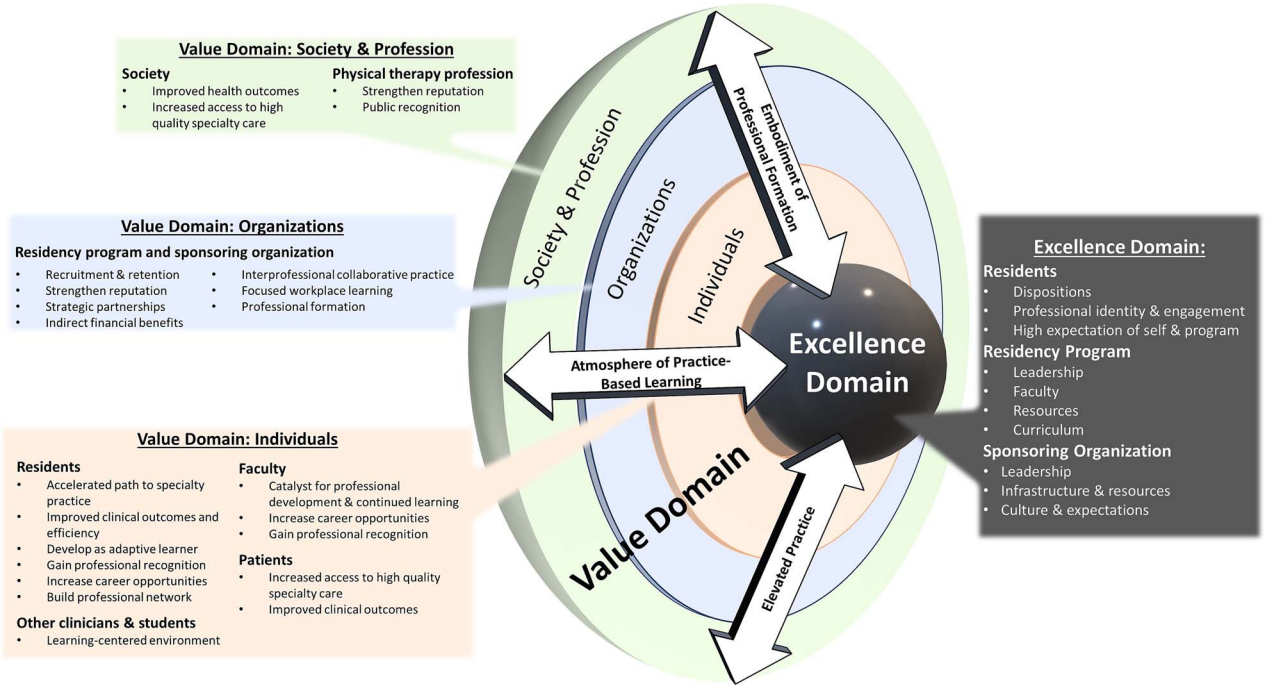

Figure 2. Conceptual model of excellence and value in physical therapist residency education. The model depicts two distinct domains with a central core illustrating the excellence domain surrounded by an expanding system of concentric spheres which represent the value domain. These concentric spheres are referred to as the "spheres of influence" which represent the value experienced directly and indirectly on individuals, organizations, and society/profession. The three signature indicators connecting the domains of excellence and value are represented by bidirectional arrows, highlighting the reciprocity between excellent residency programs and their value experienced by their surrounding communities.

of online 1 to 2 hour meetings with the research team in testing the assertions to see if the element of excellence and value applied to all cases. More specifically, the components of the PTE-21 model were integrated as an initial framework then contextualized, adapted, and focused to PT-ResEd with an emphasis on describing excellence while simultaneously expanding the scope to examine value.

The sites were given an opportunity to review and comment on their case report to ensure accuracy. Finally, after the data collection was complete, the study team conducted a 3-day in-person meeting to finalize the themes identified through the data reduction and analysis. Discussion by all members of the study team was essential to confirm the key themes and several subthemes which emanated across the case reports. Identified themes such as the culture surrounding PT-ResEd education, a focus on learning and patient care, and how value was perceived across stakeholders were further explored during discussions. These discussions led to multiple draft diagrams and figures considered preliminary drafts to the construction of a prototype model of excellence and value in PT-ResEd. Finally, we presented findings from our study at numerous national and international conferences and used feedback to further refine the model.

Standards of Verification

Multiple methods of data verification were used.[14,25,26,29]

1) Utilization of low inference data. All initial coding (open and axial coding) and thematic analysis was completed from verbatim transcripts of all recorded interviews and focus groups.
2) Individual case reports were shared with the programs for member checking.
3) Data triangulation occurred through multiple data points and collection methods (eg, review of submitted syllabi and interviews with participants as well as observations of interactions during site visits, etc).
4) Data was collected from multiple and varied sites and participants.
5) Several experienced qualitative researchers completed independent data analysis and achieved consensus on data themes and categories.

Role of the Funding Source

The funder played no role in the design, conduct, or reporting of this study.

Results

Forty-five PT-ResEd programs agreed to participate in the study (Fig. 1). Eight programs were selected for site visits, 5 were selected for virtual visits only, and 3 sites were selected for hybrid site visits. Two programs withdrew from the study resulting in 4 virtual and 2 hybrid site visits representing 20 individual residencies (Tab. 1).

Model Description

The conceptual model (Fig. 2) represents our understanding of excellence and value in PT-ResEd and is based on data consistently present across residency programs. Our graphical representation is intended to emphasize the value of excellence in residency education and highlight the reciprocity between excellent residency programs and their surrounding communities.

The model is grounded in two distinct and co-existing primary domains. The first domain is excellence, which

Table 2. Signature Indicators of Residency Excellence and Value With Supporting Evidence

Signature Indicators	Supporting Quotes or Observations
Embodiment of Professional Formation	"But honestly, it [residency training] was the best experience of my professional career, I really think that it was the pivot point and the transitional point to where I am today. The people here opened up opportunities for me . . . " (Grad – REV035) "The greatest value of residency for that individual is the ability to simultaneously expand their horizons while at the same time provide them some key markers for how to really pinpoint and craft the specific focus of their career." (Mentor – REV040) " . . . I see residency as providing this really great launching pad . . . because service is a part of the residency, so I think it helps develop that habit of providing service in our communities. And I also think that it provides great networking that may or may not be found when a new Grad hits the marketplace, so I think that pathway towards leadership and into the profession is a little more well paved." (Faculty – REV046) "So something I know [the program director] has talked a lot about his servant leadership, I hear that quite a bit around our facility and our program and you know serving the [patient], serving the resident, and hopefully modeling the behavior that we want to see to them helps to elevate clinical practice elevate staff involvement in staffs clinical practice and just make us I think professionally and personally better people." (Faculty – REV046)
Atmosphere of Practice-Based Learning	"For my experience, both of my mentors right now do a really great job at still creating a safe space, in a safe learning environment, and they have really helped me just to clean things up or just paying attention to something that I may have not noticed before." (Res – REV012) "Opportunities for real clinical discussions with their patient populations. Each clinic brings different patient populations to the discussions to share." (Admin – REV027) "I think that is like one of the nice things that this is a big hub of learning and it's not just a one way of learning... there's ...interests all over that everyone is kind of pumping out together." (Res – REV035) "It's created a culture. It sort of codifies the culture . . . Every year these residents come in, they are thirsty for knowledge, but also, I mean, it keeps enthusiasm and I think really helps to push everyone to a higher level." (PD – REV042) "It's just the culture of learning, like people want to be better." (Grad – REV046)
Elevated Practice	"What it [the residency] brings at the bedside to me is more confidence and better standard of care across all of our providers Monday through Saturday/Sunday. Because of the fellowship and the residency programs and APTA and what is required for that, it's pushed the frontline. Faculty have to practice a different way and that has spread across all of our staff." (Admin – REV012) "We've got to have the highest trained, best practitioners. We're seeing certainly some of the most complex, complicated patients, and I think residency helps support both the people that we're training, but I think, also the people that are around and part of the faculty, or even the staff benefit from some of the information that comes out of the residency. It's just win-win all the way around." (Admin – REV042) "Since, you know, we've had them, I just feel like the staff in general have elevated their practice, I mean tremendously, I mean we have so many more board-certified people on staff and just the way they practice . . . " (PD – REV046)

includes observed "elements of excellence" in the delivery of PT-ResEd. The second domain is value, which uses a systems perspective to describe the observed elements of value from PT-ResEd on individuals, organizations, and society. The excellence domain is represented as a central core that is surrounded by an expanding system of concentric spheres which represent the value domain. We refer to these as "spheres of influence," indicating the direct value experienced by individuals involved in PT-ResEd and the outwardly expanding indirect value PT-ResEd has on organizations and society through these individuals. In addition, the model has three "signature indicators" of excellence and value in PT-ResEd, which are represented as bidirectional arrows spanning from the excellence domain across all spheres of influence in the value domain. These "signature indicators" are aggregate effects of the interchange between excellence and value which sustain PT-ResEd. Supporting evidence from our data collection is provided in Table 2 and Supplementary Appendix E.

Excellence Domain. The foundational structure of the excellence domain (Fig. 3) includes three components: residents, residency program, and sponsoring organization. The residency program is centered between the residents and the sponsoring organization serving as an intermediary between the learning needs of the residents and the sponsoring organization's need for highly skilled physical therapists. Through our observations of exemplary residency programs, we discovered that a defining feature of excellence is the strong alignment between residents, residency programs, and sponsoring organizations around a shared mission focused on learning and quality patient care. This shared learning and patient care mission is represented as an alignment bar connecting the three components and providing a central schema for decision-making. We also observed several characteristics that were consistently present within each component of the exemplary programs. These elements of excellence are the fundamental building blocks that drive success and sustainability in PT-ResEd.

Resident "Elements of Excellence." Across all residency programs, excellent residents were described as having dispositions associated with lifelong learning, a strong professional identity and engagement in the profession, and high expectations for themself and for the residency experience. Frequently identified dispositions include curiosity, openness to feedback and new ideas, an internal motivation to learn, and ability to recognize professional responsibilities beyond individual patients and the organization where they practice. Excellent residents were deeply engaged in the residency experience and pushed themselves to take full advantage of the available learning opportunities.

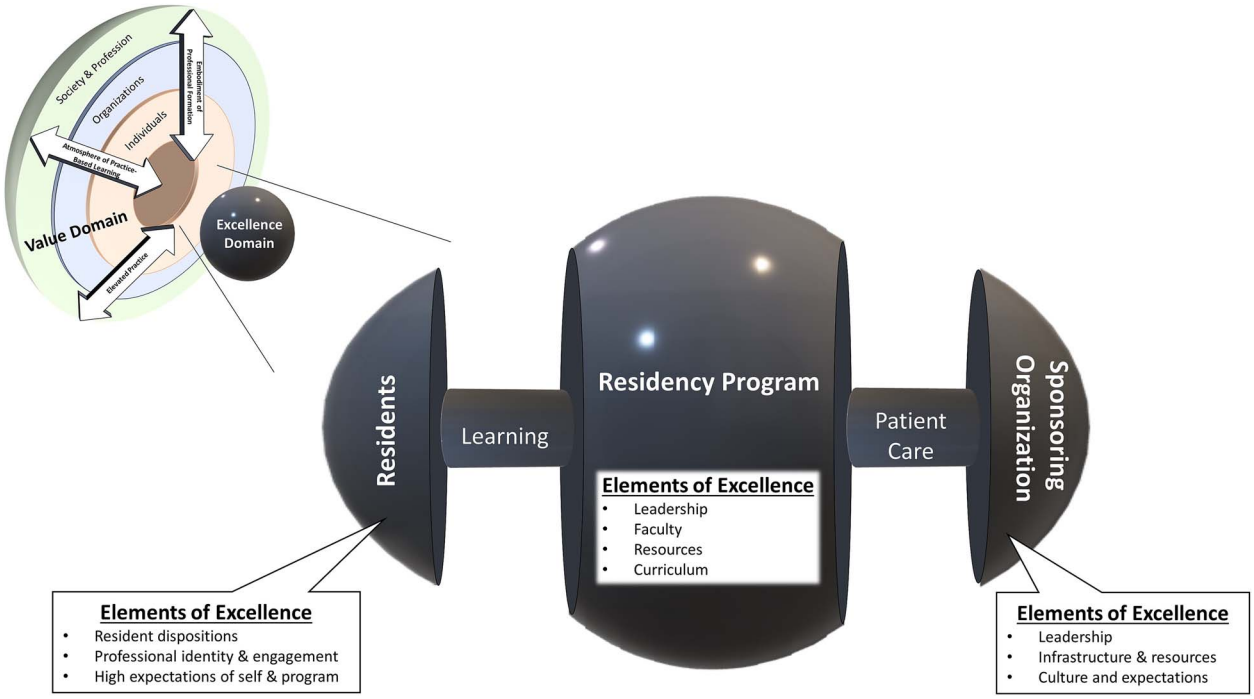

Figure 3. Expanded model of the excellence domain showing three components, residents, residency programs, and sponsoring organizations, connected by a central alignment bar representing a shared mission of learning and quality patient care. The common elements of excellence found in each component are listed in the white boxes.

Residency Program "Elements of Excellence." Excellent residency programs consistently had strong and visionary leadership, supportive and committed faculty, access to necessary resources, and a well-designed curriculum. In all cases, strong leaders who were able to establish a vision for PT-ResEd within the organization and garner the necessary resources were vital to the success of the programs. These leaders set high expectations and provided ongoing support to ensure success for both the residency program and the residents. Excellent programs also had faculty who are caring and supportive of residents, have a diversity of expertise and perspectives, and are dedicated to the wholistic development of the residents as people and professionals. Another consistent element among exemplary residency programs was the availability of resources necessary to provide a robust leaning experience. The resources cited were predominantly non-financial, encompassing access to diverse settings, experts, and experiences.

Sponsoring Organization "Elements of Excellence." The sponsoring organizations for the exemplary residency programs all exhibited three common "elements of excellence": leadership that values and supports PT-ResEd, sufficient infrastructure and resources to offer quality learning opportunities, and an organizational culture with high expectations for innovation and excellence. Senior leaders within the sponsoring organizations recognized the non-financial benefits of PT-ResEd and worked with program leadership to ensure success. Each organization provided infrastructure and resources such as a variety of practice settings, community partnerships, observation opportunities, and equipment that allowed residency programs to offer a comprehensive exploration of the associated specialty area of practice. Perhaps the most ubiquitous "element of excellence" across all sponsoring organizations was a clinical learning environment characterized by a culture of high expectations for innovation and excellence.

Value Domain. The value domain is structured as three "spheres of influence" that surround excellent residency programs (Fig. 2) and encompass key stakeholders who directly or indirectly benefit from PT-ResEd. The innermost sphere includes individuals who have direct interaction with the residency program such as residents, residency faculty, clinicians practicing alongside residents, and the patients who receive services from these individuals. Moving outward, the next sphere of influence includes the clinical and academic organizations engaged in the delivery of PT-ResEd. The outermost sphere encompasses societal stakeholders including the physical therapy profession and the communities served by residents, residency graduates, and sponsoring organizations. Organized within each "sphere of influence," "elements of value" represent the return on investment that can be expected from excellence in PT-ResEd.

Individual "Elements of Value." Direct value to the residents, such as an accelerated path to specialty practice, improved clinical efficiency and outcomes, preparation for future learning, greater professional recognition, increased career opportunities, and professional network building, were among the most frequently reported benefits of PT-ResEd. Residency graduates and faculty acknowledged that completing a residency did not make one an expert, rather the focused and structured learning associated with PT-ResEd teaches residents how to learn and develop adaptive expertise, advances their clinical reasoning, improves their knowledge and skills in an area of specialization, and condenses several years of experience into a shorter but more intense period of learning. In addition, the residency experience develops and refines the self-regulated adaptive learning skills needed to achieve adaptive expertise as a health care professional.

Residency faculty, many of which are residency graduates, find value in their role in the residency programs because it provides an opportunity for high impact professional development and continued learning. Although less directly, clinical staff and students, not directly associated with a residency program, experience value from practicing within an organization that participates in PT-ResEd. This value is in the form of exposure to a robust clinical learning environment that fosters engagement in continual learning and provides satisfaction to all clinical staff. Finally, feedback from various stakeholders, including patients, expressed the value of receiving care from clinical organizations that sponsor PT-ResEd programs. This value is perceived as increased access to high quality specialty care and improved clinical outcomes associated with the robust clinical learning and expectations of excellence within these organizations.

Organizational "Elements of Value." Financial gain was not a motivating factor to participate in PT-ResEd for any of our sites. Although each residency program had a goal of budget neutrality, organizational leaders recognized that participation in PT-ResEd provided indirect financial benefit to the sponsoring organization through "elements of value" such as recruitment and retention of highly motivated and engaged clinicians (many of whom are also residency faculty), improved patient satisfaction, and improved reputation within the community that leads to referral relationships and strategic partnerships. In addition, residency programs provide a structured and focused model of workplace learning that fosters advancement in clinical care as well as professional formation for all clinicians. Furthermore, the residency programs offer a mechanism for meaningful interprofessional education and collaborative practice. Combined, these elements of enhanced learning, professional formation, and interprofessional collaboration help to elevate the perception of physical therapists' contributions to the health care team.

Societal "Elements of Value." A common sentiment expressed by organizational administrators and residency program faculty was the value of PT-ResEd to the surrounding communities. This value is realized through the improved level of practice engaged in by the residents, residency graduates, and sponsoring organizations. This elevated practice is thought to increase public recognition and strengthen the reputation of the physical therapy profession within the health care community and society more broadly. Furthermore, development of adaptive learning skills, greater integration with other health care professionals, and high functioning learning environments surrounding PT-ResEd are drivers of improved societal health through increased access to high-quality specialty care and improved clinical outcomes.

"Signature Indicators". Through our study of exemplary residency programs, we discovered three "signature indicators" of excellence and value in PT-ResEd: an atmosphere of practice-based learning, embodiment of professional formation, and elevated practice. An atmosphere of practice-based learning is characterized by deep learning achieved through mentorship, reflection, and emersion in a community of practice centered around clinical encounters with patient populations relevant to the specialty area of practice. Embodiment of professional formation is an indicator of the faculty's modeling of professionalism and lifelong learning as well as the development of these characteristics in the residents which expands into others surrounding the residency program. Elevated practice is the fulfillment of physical therapists' societal obligation and is represented by as state of continual learning and innovation that improves health care quality, efficiency, and patient outcomes. Collectively, these signature indicators represent the observable behaviors that result from the elements of excellence, providing value to the surrounding spheres of influence. In turn, the presence of these behaviors across the spheres of influence contributes back to the residency program by creating environments that sustain and strengthen the elements of excellence.

Discussion

Our PT Residency Excellence and Value (PT-REV) model (Fig. 2) aligns with and expands our understanding of excellence across the physical therapist education continuum by building on the core domains of the PTE-21 study.[14,22,23] Consistency between models include the importance of the people and culture surrounding physical therapist education, a central focus on learning and patient care, and the infrastructure and resources that provide meaningful learning experiences. "Elements of excellence" related to strong leadership, shared beliefs, and high expectations have been expanded upon in the PT-REV model by subdividing the domain of excellence into three components and describing the specific characteristics of excellence present within individuals in each component. A central focus on learning and patient care is also present in both models. In the PT-REV model, the *learner* centered focus was expanded to a *learning* centered focus, representing the residency as a catalyst not only for residents' learning but also for other clinicians associated with the residency. Both models recognize that excellence requires adequate resources to provide learners with meaningful learning experiences but acknowledge that this can be accomplished under a variety of structures. Further, the PT-REV model includes the addition of a value domain. Understanding the value of PT-ResEd is vital in determining the role of residency education in the physical therapist education continuum and ultimately the overall value of PT care.[6,20] The value domain in the PT-REV model provides evidence supporting the value of PT-ResEd across multiple stakeholders and provides a framework for future research. Similarly, the "signature indicators" of excellence and value in PT-ResEd offer a composite set of observable phenomena that can be used to assess residency program effectiveness and guide future research.

Atmosphere of Practice-Based Learning

Individuals from sponsoring organizations with exemplary residency programs, communicated that the presence of residents and the structure of the residency program created a catalyst for learning and improvement that was changing the culture within the organizations even among health care professionals not directly involved in the residency program. Similar findings have been shown among clinicians peripheral to a newly implemented orthopedic physical therapist residency.[30] These observations are consistent with Wenger's description of how communities of practice function to foster learning, excellence, and value for organizations across multiple industries, including health care.[31–35] Clinical environments that embrace a learning culture are essential to an effective learning

health system and, as our findings indicate, are a signature indicator of excellence and value in PT-ResEd.[14,36]

Embodiment of Professional Formation

Professional formation has been defined as a "moral and ethical core of service and responsibility around which habits of mind and practice could be organized."[23,37] The essential features of high-quality work, deep expertise, and ethical commitment come together in the formational process and continued development of professional identity.[22,23,38] The residency programs in our study demonstrated that professional formation was a part of the culture being consistently and intentionally emphasized within the community of practice. Such embodiment and commitment are indicators of the residency faculty's modeling of professionalism and lifelong learning as well as the development of these characteristics in the residents. Stakeholders expressed this kind of engagement and quality focus has the potential to expand to other colleagues surrounding the residency program.[30] This is consistent with literature showing residency trained physical therapists have stronger perceived leadership skills, stronger communication skills, perceived advanced clinical aptitude/competency, greater percentage of clinical board specialization, and more involvement in teaching/mentoring compared to non-residency trained physical therapists.[2,9,10,12,13]

Elevated Practice

Theoretically, elevated practice is the culmination of the learning that occurs during the residency experience.[34,39,40] The presence of PT-ResEd within an organization positively impacts and elevates practice throughout that organization through a culture of continuous learning and improvement, greater use of evidence based practice, and reduction in unwarranted variation in practice.[30,41] This leads to a consistent application of current best practice focused on optimizing patient outcomes and supports more efficient delivery of care.[42]

The impact and value of PT-ResEd on patient outcomes is multi-factorial and is challenging to evaluate; evident from the residency programs participating in our study. There was anecdotal support from patients, administrators, and clinicians, but the objective measures of value were difficult to empirically demonstrate. Despite this, the sponsoring organizations expressed that having residencies promoted a culture of best practice which they perceived as a value of improved quality of patient care.

Limitations

Although we attempted to include all ABPTRFE accredited residencies, not all residencies responded or agreed to participate in the study. Further, to limit potential bias, we excluded organizations/institutions affiliated with, or represented by, the study team. This may have limited other examples of excellence and value. In addition, the overall sample of residency programs visited was small (n = 6; 20 individual residencies). However, our sample selection was intentional and represented institutional, specialty, and geographic diversity. Further, the patient perspective was limited in our data as we were only able to interview patients at one site. Due to scheduling, it was not feasible to interview patients at other sites. Next, the utilization of virtual site visits, due to the COVID-19 pandemic, did not allow for direct observation of the environment in the same manner as being present and may have impacted program willingness to participate in the study.

Conclusion

This study is the first to examine excellence and value of PT-ResEd on a national scale. We have identified key elements of what makes PT-ResEd programs excellent, the value of PT-ResEd, and related outcomes. Results from this study support and build upon elements in the PTE-21 model and the Vision for Excellence in PT Education.[14,15,22,23] We also propose critical action items and recommendations necessary for the physical therapist profession to leverage the full potential of PT-ResEd in meeting societal need in.[43] Much like the past Carnegie studies in nursing and medicine, and the PTE-21 study,[14,22,23] results from our study could have compelling and powerful implications on the dialogue and strategic direction in PT-ResEd. The recommendations and action items could serve as a standard point along the pathway and continuum of physical therapist education while magnifying the message that PT-ResEd is a valued component in adaptive learning and development of expertise. Finally, this study, supported by the REV model, substantiates the need for PT-ResEd to be a standard part of the physical therapist education continuum.

Author Contributions

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Ethics Approval

All procedures for this study were reviewed and determined exempt by The Ohio State University Internal Review Board (IRB) (2021E0872).

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Data Availability

De-identified case descriptions used for qualitative analysis are available upon request. Raw data is not available due to requirements for maintaining participant confidentiality.

Disclosures and Presentations

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

Matthew Briggs: Member and Past Chair, American Board of Physical Therapy Residency and Fellowship Education (ABPTRFE), Gregory Hartley: Candidacy Review Council and Accreditation Site Review Team, ABPTRFE; DPT to Residency Pathway Task Force, ABPTRFE. Mary Jane Rapport: Candidacy Review Council, ABPTRFE; DPT to Residency Pathway Task Force, ABPTRFE.

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