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The Development of Identity, Self-Efficacy, and Persistence Intentions Among Frontline Healthcare Apprentices

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THE DEVELOPMENT OF IDENTITY, SELF-EFFICACY, AND PERSISTENCE INTENTIONS AMONG FRONTLINE HEALTHCARE APPRENTICES

by

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DISSERTATION

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DEDICATION

For Paloma

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ABSTRACT

Apprenticeship, an established learning model and workforce development strategy, is increasingly used in frontline healthcare occupations. Through three research papers, this dissertation examined the impacts of U.S. registered apprenticeship and what promotes success. I used qualitative and mixed methods to explore the development of self-efficacy, professional identity, and persistence intentions among frontline healthcare apprentices. After analyzing data from a systematic literature review (n=134), interviews (n=17), and surveys of frontline healthcare apprentices and workers (n=71), I identified themes in registered apprenticeship; revealed gaps in research on the design of apprenticeship that promote learning and success; designed and evaluated a survey to be used in registered apprenticeship programs; and described developmental trajectories of professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices. This set of research studies identified a key distinction between caregiving and professional healthcare self-efficacy and identity and contributed knowledge about designing for frontline apprentice success.

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Chapter 1

Introduction

Background

As the U.S. population ages and current workers retire, there is an urgent and growing demand for nurses and many other roles in healthcare (Bateman et al., 2922; Haddad et al., 2022). Frontline healthcare workers (FHCWs) are in particularly high demand (U.S. Bureau of Labor Statistics, 2022), including homecare providers, medical assistants, certified nursing assistants, emergency medical technicians, and others who provide direct care and support to the public. These frontline positions, which typically require more than a high school diploma but less than a four-year degree, are known to be arduous and stressful, with high turnover (Froessl & Abdeen, 2021; Swanberg & Bright, 2016; Willis et al., 2021). Workforce development strategies are needed that create pipelines to fill these positions with workers who are not only properly skilled, but also prepared for the rigors of frontline caregiving.

In order to meet these needs, employers, labor unions, and their training partners are increasingly turning to registered apprenticeship (RA). Modern RA in the United States is a government-regulated approach to job training that blends contextualized classroom instruction with on-the-job learning. Though traditionally practiced in the U.S. in the building trades and manufacturing industries, RA has been expanding in recent years to many new sectors, including service occupations such as hospitality and frontline healthcare roles. It is a particularly promising model in these high-demand occupations because apprenticeship is fundamentally a job: apprentices do the hands-on work they are aspiring to from day one. They typically have access to experienced mentors, various types of wraparound supports, regular wages, an employer invested in their success, and the promise of a culminating industry-recognized credential. It is a model that has demonstrable benefits for employers and for workers (Amoyaw & Brown, 2019; Helper, 2016).

Much of the research on apprenticeship has been carried out in the building trades and manufacturing contexts in the U.S., which are notably distinct from frontline healthcare contexts, and in other countries, such as Germany, where approaches to apprenticeship often differ greatly from the RA model (Bosch & Charest, 2008). Much of the research in the U.S. has also been carried out by scholars interested in the economic impacts of RA, not in the curriculum, instruction, and other learning design elements of registered apprenticeship programs (RAPs) (Gallup, 2024). There is a robust literature on learning outcomes in healthcare occupations and the impacts of various program design elements (e.g., mentorship, simulation), but these tend to be carried out among learners in higher-prestige roles such as physicians, medical students, and baccalaureate in nursing students. Learners in these higher-prestige roles and contexts often differ significantly from frontline healthcare apprentices in socio-economic status; educational background and academic skills; age; time and money available for education; and membership in marginalized groups, with all the systemic barriers to access and opportunity that accompany these differences (Amoyaw & Brown, 2018; Ball, 2021; Barton, 2019; Love & McCarthy, 2018; Smiley et al., 2021). They may also differ in the identities and types of self-efficacy they bring to their RAPs (Illeris, 2006).

Statement of the Problem

RA sponsors are making changes to the model to accommodate different contexts and needs of apprentices in the industries to which RA is expanding, including frontline healthcare. However, because there is a gap in the research on learning in RA and among workers generally in lower-prestige frontline occupations (Gallup, 2024; Hedayati-Mehdiabadi & Li, 2016), it is difficult to determine what changes are helpful and necessary and which may impact the success of the learning experience and, ultimately, the apprentice's ability to complete the apprenticeship and persist in their occupation. The development of professional identity and self-efficacy have been associated with persistence intentions in adjacent contexts, but there is reason to believe that they may develop differently among frontline apprentices with distinct backgrounds, experiences, characteristics, and barriers. RA - with its built-in wages, hands-on learning,

mentorship opportunities, and long track record in workforce development - is likely a beneficial workforce development and learning model for FHCWs, but it is worth asking what pitfalls may lurk in the adaptation of the model to a new context and what promotes the development of professional identity, self-efficacy, and persistence intentions for this distinct population.

Significance of the study

This study has scholarly significance for two main reasons. First, there are sizeable gaps in the literature on learning in RA and how best to design apprenticeships – and workplace learning opportunities more generally – for workers in lower-prestige positions, many of whom may experience multiple barriers to persistence. Second, research on the development of professional identity and self-efficacy in healthcare occupational contexts have largely been carried out among professionals in higher-prestige occupations and university-based degree programs. However, low-wage workers and other marginalized workers have been shown to differ from these higher-educated groups in consequential ways that may also impact the development of these characteristics and impact their persistence intentions. This study contributes to scholarly knowledge in these areas.

In terms of practice, findings from this study may inform RAP design for frontline healthcare apprentices, which is an area of growth in the U.S. Deeper understanding of the characteristics, needs, preferences, and barriers of frontline apprentices can contribute to more learner-centered designs, more effective learning experiences, and ultimately to increased RAP completion rates and persistence among FHCWs, who are in critically high demand nationally.

Study Purpose and Research Questions

The three papers of this hybrid dissertation were designed to identify what is known about RA in the U.S. and to identify gaps in that literature; to contribute to knowledge about the experiences of frontline healthcare apprentices and the development of professional identity,

self-efficacy, and persistence intentions in an understudied context; and to develop a research-based survey that RA sponsors can use to inform the design of RAPs for frontline apprentices.

I explored the following research questions across three papers:

- Paper 1: What are the trends and impacts of registered apprenticeship on apprentices and employers based in the United States in the last 30 years?
- Paper 2: How and in what ways do frontline apprentices describe their professional identity, self-efficacy, and persistence trajectories through a RAP? What do they cite as contributing to their success?
- Paper 3:

    1. To what extent does the Survey of Transformative Apprenticeship Experiences (STAE) provide useful information about frontline apprentices' professional identity, self-efficacy, and persistence intentions?
    2. To what extent do frontline healthcare apprentices' self-efficacy and identity predict their persistence intentions?

Overview of Paper Set

The three papers in the dissertation set applied several different research methodologies to build an in-depth understanding of themes and outcomes in apprenticeship in the United States and the development of self-efficacy, identity, and persistence intentions among frontline healthcare apprentices, an understudied population that is crucial to addressing the shortage of skilled healthcare workers in this country. The first paper, a systematic review and qualitative synthesis of the findings from empirical studies on registered apprenticeship in the last 30 years, created a conceptual foundation for the dissertation. It identified themes in the outcomes attributed to the model and pinpoints gaps in research, particularly pertaining to design elements that promote learning and success among frontline apprentices with barriers to participation and persistence in apprenticeship. Informed by these findings and gaps, the second paper used a

multiple case study approach to qualitatively explore the developmental trajectories of self-efficacy, identity, and persistence intentions among frontline healthcare apprentices with particular attention to how the apprentices describe supportive elements of their apprenticeship experience. In addition to composite cases that illustrate these trajectories, the study identified noteworthy distinctions in types of self-efficacy and identity in this population, shedding light on sources of strength and challenge. The third paper used survey development methodology to build on the findings of the second paper, creating and evaluating an instrument for measuring the development of self-efficacy, professional identity, and persistence intentions among frontline healthcare apprentices and contributing a useful tool to help apprenticeship leaders and designers make programmatic design decisions.

Table 1.1.

The three papers in the dissertation set

1.	Gallup, A. (2024). What we know about registered apprenticeship: A systematic review and synthesis of 30 years of empirical research. *Economic Development Quarterly*, *38*(1), 25-39. https://doi.org/10.1177/08912424231196792
2.	Gallup, A. & Svihla, V. (2024). Promoting success among frontline healthcare apprentices [Manuscript submitted for publication].
3.	Gallup, A. & Svihla, V. (2024). Development of the Survey of Transformative Apprenticeship Experiences (STAE) – A measure of professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices [Unpublished manuscript].

Theoretical/Conceptual Framework

Registered apprenticeship as a learning model is aligned with constructivist theories of adult learning and research on the development of identity and self-efficacy. In their foundational work on situated learning and communities of practice, Lave and Wenger (1991) use apprenticeship to illustrate their conceptualization of learning as a social and active process. Through legitimate peripheral participation, apprentices gradually move to the center of a community of practice as they develop new facets of their identities as skilled practitioners and become full community members. In addition to its potential to foster professional identity development, apprenticeship also provides productive contexts for the development of self-efficacy, including opportunities for mastery experiences, vicarious experiences of success through the observation of role models, and a built-in cohort of peers, mentors, and – in the case of frontline healthcare – patients to provide the encouragement that builds confidence (Bandura, 1997). Some research on apprenticeship in U.S. and other countries, as well as studies in adjacent education contexts (e.g., nursing, science education) has shown how the development of identity or professional identity and self-efficacy contribute to persistence (Chow-Garcia et al., 2022).

Key terms

In these three papers, I used several key terms and theoretic constructs. I list the key terms below and the constructs in Table 1.2.

Registered apprenticeship (RA) is both of model of adult learning and approach to workforce development that was federalized in the United States in 1937 by the Fitzgerald Act and further regulated by the Taft-Hartley Act of 1947. A *registered apprenticeship program* (RAP) has several required components (U.S. Department of Labor, 2023):

- A paid job with a participating employer;

- *On-the-job training* (OJT), while performing the job, supervised and *mentored* by an experienced other;
- *Related technical instruction* (RTI), which incorporates classroom-based instruction of job-related concepts and skills
- Structured wage progression, in that as apprentices typically gain incremental wage increases tied to RAP milestones;
- Career advancement along a predetermined pathway, leading to an industry-recognized credential.

Frontline healthcare worker (FHCW) is a professional who performs hands-on, essential services at a clinic, hospital, or other healthcare setting, typically dealing directly with the public.

Frontline healthcare occupations include *certified nursing assistant* (CNA), *emergency medical technician* (EMT), *medical assistant* (MA), homecare worker, community health worker, and other roles that are crucial to public health.

Table 1.2.

Constructs investigated in this dissertation

Study constructs	*Definition*	*Clarifying points and related constructs*
Professional identity	A worker's representation of self, developed over time, which includes the internalized values and norms of an occupation. This process of internalization leads the worker to think, act, and feel like a professional in that field over time (Cruess et al., 2014; Jarvis-Selinger, Pratt, & Regehr, 2012).	Individuals' identities are multiple and multifaceted. Professional identity is defined separately from other identities that a FHCW might have, including learning identity (Kolb & Kolb, 2009; Tett, 2019) and caregiver identity (Eifert et al., 2015; Montgomery & Kosloski, 2009; Montgomery et al., 2007).

Caregiver identity	A dynamic conceptualization of the self as a caregiver that slowly develops and transforms over time in response to changes, large and small, in caregiving tasks and the relationship to the care recipient (e.g., from spouse, child, or friend to, increasingly, caregiver) (Montgomery & Kosloski, 2009). These changes can cause distress and a feeling of incongruence between one's identity and new caregiving responsibilities and erode former identities (Eifert et al., 2015). Obtaining relief from the distress requires identity change (Montgomery & Kosloski, 2009). we define caregiver identity as a dynamic self-conceptualization as a person who has an innate calling to provide compassionate care to others.	Montgomery and Kosloski (2009) identify a final phase of caregiving in which care is turned over to formal healthcare providers, allowing the caregiver to reclaim a measure of the original caregiving identity. These caregiving experiences and transitions are often cited in our interviews as turning points that draw caregivers to professional healthcare roles. Interviews pointed to a relationship between an existing caregiving identity and the development of a professional identity as a healthcare provider.
Healthcare self-efficacy	This is an FHCW's beliefs about their ability to do the professional role they are apprenticing for. These beliefs can impact a person's competence and performance in a professional context (Bandura, 1997).	In the nursing literature and elsewhere, self-efficacy is sometimes termed confidence; in this literature, they are treated as synonyms. In this dissertation, I cite this literature but I use the term self-efficacy.
Caregiver self-efficacy	This is an FHCW's beliefs about their ability to provide high-quality care to patients, family members, and other loved ones (Bandura, 1997).	This construct emerged from the analysis of interviews in Paper 2. This is an important construct in the fields of gerontology, psychology, behavioral sciences, among others. A scale of caregiving self-efficacy exists (Steffen et al., 2019) and will contribute to the development of the scale in Paper 3 of this dissertation.

Persistence intentions	An individual's intent to continue on the educational or career path on which they have embarked. In the context of this study, we refer to apprentices' plans and disposition to complete their RAP and to continue to maintain a career in the field of healthcare after completion of the RAP (Her & Thompson, 2022; Navarro et al., 2019).	This construct is prevalent but not well-defined in the literature; it is often treated as though the meaning is self-evident. In the scholarly literature in healthcare, this construct is often called intent to stay or career intent (Halcomb et al., 2018; Kim et al., 1996; Li et al., 2020).

Scope and Delimitation

The scope of the study is narrowed to registered apprenticeship in the United States. I deliberately excluded non-registered apprenticeships in the U.S. This is not commentary on the quality of non-registered apprenticeships; rather, it is an acknowledgement that there is little data collected on these programs. As such, the extent of their comparability with registered apprenticeship programs is unknown. The scope of the second and third papers is narrowed to the experiences of registered apprentices in frontline healthcare occupations, which comprise many healthcare roles and can, as a group, be distinguished from other frontline occupations (e.g., in retail and hospitality) including prerequisites for and the nature of the work. I also excluded apprenticeship models practiced in other countries because they can vary greatly from the model practiced in the U.S. and also because some European models have more extensive treatment in the literature. Similarly, I excluded other types and conceptualizations of apprenticeship, including cognitive apprenticeship (a theoretical approach) and youth apprenticeship (a compelling model that sometimes does not include some characteristics of adult registered apprenticeship that are key to my study).

The study also excludes from in-depth study some elements of registered apprenticeship that may impact apprentices' persistence, learning, and success, such as curriculum and instruction; the role of community colleges and outside training entities; variations in mentoring schemes; and the role of unions in RA. In our approach to the study of persistence, we chose to

focus on persistence intentions rather than persistence. The latter construct requires a longitudinal study design of several years which is not practical for a dissertation study.

Factor analysis and other quantitative validation measures are beyond the scope of the current study. Future studies building on the survey development process we reported upon in the third paper can undertake such analysis. Frontline healthcare apprenticeship programs are growing in number but are still rare compared to associate degree programs and other more traditional training programs. In addition, these RAPs are typically small in size, training only a few apprentices at a time. Under these conditions, it could require over a year of data collection or more to amass the larger sample sizes typically used for factor analysis.

Finally, I note that the focus of the study included consideration of the barriers to RAP participation and completion of the diverse populations who seek to become frontline healthcare apprentices. These barriers include lack of access to transportation and childcare, financial pressures, a likelihood of negative learning identities due to past experiences, and systemic barriers faced by marginalized groups. While these barriers are crucial to the understanding of the study contexts, our focus was not on understanding why and how the barriers have come about but rather on understanding how learning and RAP success can take place in their presence and what RAP staff and participants can do to mitigate their impact.

References

Amoyaw, M., & Brown, D. (2018). *Apprenticeship America: An idea to reinvent postsecondary skills for the digital age.* Third Way.

Ball, W.S. (2021, November 26). *Am I too old for nursing school?* Nurse Plus Academy. https://nurse.plus/become-a-nurse/am-i-too-old-for-nursing-school/

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman and Company.

Barton, A. J. (2019). Apprenticeships in nursing: Back to the future? *Journal of Nursing Education, 58*(1), 3-6. https://doi.org/10.3928/01484834-20190103-01

Bateman, T., Hobaugh, S., Pridgen, E., & Reddy, A. (2021). *U.S. healthcare labor market*. Mercer.

Bosch, G., & Charest, J. (2008). Vocational training and the labour market in liberal and coordinated economies. *Industrial Relations Journal, 39*(5), 428-447. doi:10.1111/j.1468-2338.2008.00497.x

Chow-Garcia, N., Lee, N., Svihla, V., Sohn, C., Willie, S., Holsti, M., & Wandinger-Ness, A. (2022). Cultural identity central to Native American persistence in science. *Cultural Studies of Science Education*, *17*(2), 557-588. https://doi.org/10.1007/s11422-021-10071-7

Crellin, N. E., Orrell, M., McDermott, O., & Charlesworth, G. (2014). Self-efficacy and health-related quality of life in family carers of people with dementia: A systematic review. *Aging & Mental Health, 18*, 954–969. doi:10.1080/13607863.2014.915 921

Cruess, R. L., Cruess, S. R., Boudreau, J. D., Snell, L., & Steinert, Y. (2014). Reframing medical education to support professional identity formation. *Academic Medicine*, *89*(11), 1446-1451. https://doi.org/10.1097/acm.0000000000000427

Eifert, E. K., Adams, R., Dudley, W., & Perko, M. (2015). Family caregiver identity: A literature review. *American Journal of Health Education*, *46*(6), 357-367. https://doi.org/10.1080/19325037.2015.1099482

Froessl, L. J., & Abdeen, Y. (2021). The silent pandemic: The psychological burden on frontline healthcare workers during COVID-19. *Psychiatry Journal*, *2021*. https://doi.org/10.1155/2021/2906785

Gallup, A. (2024). What We Know About Registered Apprenticeship: A Systematic Review and Synthesis of 30 Years of Empirical Research. *Economic Development Quarterly*, *38*(1), 25-39. https://doi.org/10.1177/08912424231196792

Haddad, L.M. Annamaraju, P., Toney-Butler, T.J. (2022). *Nursing shortage*. National Library of Medicine. https://www.ncbi.nlm.nih.gov/books/NBK493175/

Halcomb, E., Smyth, E., & McInnes, S. (2018). Job satisfaction and career intentions of registered nurses in primary health care: an integrative review. *BMC family practice*, *19*(1), 1-14. https://doi.org/10.1186/s12875-018-0819-1

Helper, S., Noonan, R., Nicholson, J. R., & Langdon, D. (2016). *The benefits and costs of apprenticeships: A business perspective*. US Department of Commerce. https://files.eric.ed.gov/fulltext/ED572260.pdf

Her, P., & Thompson, M. N. (2022). Examining the persistence intentions of college students of color. *Journal of Career Assessment*, *30*(1), 41-59. https://doi.org/10.1177/10690727211010382

Holland, D., Lachicotte, W., Skinner, D., & Cain, C. (1998). *Agency and identity in cultural worlds.* Harvard.

Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education, 25*(1), 15-28. https://doi.org/10.1080/02601370500309451

Jarvis-Selinger, S., Pratt, D. D., & Regehr, G. (2012). Competency is not enough: integrating identity formation into the medical education discourse. *Academic medicine*, *87*(9), 1185-1190. https://doi.org/10.1097/acm.0b013e3182604968

Kim, S. W., Price, J. L., Mueller, C. W., & Watson, T. W. (1996). The determinants of career intent among physicians at a US Air Force hospital. *Human relations*, *49*(7), 947-976. https://doi.org/10.1177/001872679604900704

Kolb, A., & Kolb, D. (2009). On becoming a learner: The concept of learning identity. In *Learning never ends: Essays on adult learning inspired by the life and work of David O. Justice*, *CAEL Forum and News*, 5-13.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Li, X., Zhang, Y., Yan, D., Wen, F., & Zhang, Y. (2020). Nurses' intention to stay: The impact of perceived organizational support, job control and job satisfaction. *Journal of advanced nursing*, *76*(5), 1141-1150. https://doi.org/10.1111/jan.14305

Love, I., & McCarthy, M. A. (2018). *Apprenticeship and the future of nursing: An equity-based strategy to address the bachelor's degree gap.* New America Foundation.

Hedayati-Mehdiabadi, A., & Li, J. (2016). Understanding talent development and implications for human resource development: an integrative literature review. *Human Resource Development Review*, *15*(3), 263-294. https://doi.org/10.1177/1534484316655667

Montgomery, R. J. V., & Kosloski, K. (2009). Caregiving as a process of changing identity: Implications for caregiver support. *Generations, 33*(1), 47–52. https://doi.org/10.1007/978-1-4614-5553-0_8

Navarro, R. L., Flores, L. Y., Legerski, J. P., Brionez, J., May, S. F., Suh, H. N., ... & Jung, A. K. (2019). Social cognitive predictors of engineering students' academic persistence intentions, satisfaction, and engagement. *Journal of Counseling Psychology*, *66*(2), 170. https://doi.org/10.1037/cou0000319

Nichols, H. M., Swanberg, J. E., & Bright, C. L. (2016). How does supervisor support influence turnover intent among frontline hospital workers? The mediating role of affective commitment. The Health Care Manager, 35(3), 266-279. https://doi.org/10.1097/hcm.0000000000000119

Smiley, R. A., Ruttinger, C., Oliveira, C. M., Hudson, L. R., Allgeyer, R., Reneau, K. A., ... & Alexander, M. (2021). The 2020 national nursing workforce survey. *Journal of Nursing Regulation*, *12*(1), S1-S96. https://doi.org/10.1016/s2155-8256(21)00027-2

Steffen, A. M., Gallagher-Thompson, D., Arenella, K. M., Au, A., Cheng, S. T., Crespo, M., ... & Romero-Moreno, R. (2019). Validating the revised scale for caregiving self-efficacy: A cross-national review. *The Gerontologist*, *59*(4), e325-e342. https://doi.org/10.1093/geront/gny004

Tett, L. (2019). Transforming learning identities in literacy programmes. *Journal of Transformative Education*, *17*(2), 154-172. https://doi.org/10.1177/1541344617750277

U.S. Bureau of Labor Statistics. (2022). *Occupational outlook handbook: Healthcare occupations.* https://www.bls.gov/ooh/healthcare/home.htm

Chapter 2

Gallup, A. (2024). What we know about registered apprenticeship: A systematic review and synthesis of 30 years of empirical research. *Economic Development Quarterly*, *38*(1), 25-39. https://doi.org/10.1177/08912424231196792

What we know about registered apprenticeship: A systematic review and synthesis of 30 years of empirical research

Abstract

Apprenticeship is a time-tested learning model and workforce development strategy. In the United States, registered apprenticeship – a structured form of apprenticeship that is regulated and overseen by government agencies – has been expanding from the skilled trades into new industries. To inform this expansion and contribute to the understanding of how the model serves apprentices and employers, I undertook a systematic literature review and a qualitative synthesis of empirical research, interpreting findings on registered apprenticeship over a 30-year period. My review identified 36 scholarly studies and an additional 98 articles from the practitioner literature. My synthesis derived three themes: *expansion, benefits,* and *outcomes for minoritized groups,* revealing gaps in research on the curricular and instructional design elements of registered apprenticeship that promote retention, completion, career advancement, and learning for apprentices.

Introduction

Apprenticeship has long been used to facilitate the passing of skills and knowledge from experienced craftspeople workers to the next generation. In the United States, a system that first indentured young boys to skilled masters, and later involved workers trained by industrial employers, gradually apprenticeship transformed into a union-dominated system of occupational

education (Jacoby, 1991) that endures today. The principles of this time-honored model have been incorporated into influential theories of learning (Brown et al., 1989; Lave & Wenger, 1991) and informed thriving systems of transition from school to work in countries such as *Canada*, Austria, Germany, Switzerland, and the U.K. (Dummert, 2020; Fortwengel et al., 2021).

In the United States today, the most a common and well-funded apprenticeship model is registered apprenticeship (RA). Federalized in 1937 by the Fitzgerald Act (also known as the National Apprenticeship Act) and further regulated by the Taft-Hartley Act of 1947, RA is both a model of adult learning and an approach to workforce development that is regulated by federal and state agencies. The essential elements of RA are a paid job with a participating employer; on-the-job training (OJT), supervised and mentored by an experienced other; related technical instruction (RTI), which incorporates classroom-based instruction of job-related concepts and skills; structured wage progression; and career advancement along a predetermined pathway, leading to an industry-recognized credential. Outside of these essential elements, models for registered apprenticeship programs (RAPs) can vary based on whether unions are involved or not (joint or non-joint), and whether one employer or several sponsor the training (non-group or group). RAPs take one to six years to complete, depending on the occupation and industry. Sponsors and apprentices finance training together: sponsors contribute resources, instruction, and funds, while apprentices may accept lower wages for the duration of the RAP. The majority of RAPs have historically been in the building trades (Bilginsoy, 2003; Sharp & Dvorkin, 2018). This fact is due in part to the Davis-Bacon Act of 1950, which requires the payment of prevailing wages on federally-funded construction projects and stimulated the growth of RAPs in this industry. It is also important to note that around half of all apprenticeship programs are unregistered and it is likely that there more unregistered apprentices than registered (Jacoby & Lerman, 2019). While the current study excluded these programs, they are an important area of current and future research.

RA persists within a rapidly changing context. The current U.S. labor market can be characterized as increasingly based on knowledge and service work, with a growing polarization

between high- and low-quality jobs and between higher- and lower-educated workers (Buera & Kaboski, 2012). Employment opportunities in manufacturing and agriculture have significantly declined while lower-quality, more precarious service sector jobs have proliferated (Kalleberg, 2011). Non-college-educated workers are much more likely to hold these lower-paying jobs (Kearney et al., 2015), as are non-white and immigrant workers (Kalleberg & von Wachter, 2017). As these lower-quality, frontline service occupations have grown, so has economic inequality have the economic disparities that divide people by race, ethnicity, and gender (Kalleberg). Since RA is a notably low-cost career advancement option for apprentices, this frontline worker population is poised to benefit from the growth and expansion of RA in the U.S., particularly in the service industry (Kuehn, 2019).

While the promise of RA for these workers seems evident, a scholarly basis for this enthusiasm is harder to find. Much of the research on apprenticeship has been carried out in European and Australian contexts, which differ greatly from the U.S.'s RA model (Bosch & Charest, 2008). As RA expands into new industries, notably the service industry, sponsors are changing the model in ways that raise important questions about what promotes learning, retention, and completion in RAPs, particularly among frontline service and healthcare workers. Without an empirically-based understanding of what contributes to RA's success and failure in the U.S. context, we risk diluting the model and threatening its efficacy. Furthermore, no prior study has systematically investigated what is known about U.S. apprenticeship. Therefore, this study answers the research question: What are the trends and impacts of registered apprenticeship on apprentices and employers based in the United States in the last 30 years?

Methodology

To answer the research question, I conducted a systematic review of all empirical literature on registered apprenticeship in the United States in a 30-year period (January 1991 – January 2021) and undertook a qualitative research synthesis of the findings of those studies. A systematic literature review provides a comprehensive overview of existing literature,

summarizes findings, informs policy and practice, and identifies gaps in research, with the goal of informing future research (Okoli, 2015). I chose a critical interpretive synthesis approach (Dixon-Woods et al., 2006; Heyvaert et al., 2017), which aims for integration of qualitative, quantitative, and mixed methods research findings, viewed through the lens of theory. Critical interpretative synthesis incorporates the constant comparative method of data analysis and an inductive process for generating themes. This approach allows for consideration of the effectiveness of registered apprenticeship and its appropriateness in various contexts and for different groups of learners but requires a critical stance toward the data. In the case of this study, I maintain questions about the primary authors' emphases on economic outcomes of apprenticeship while de-emphasizing the role that program design choices play in learning and success outcomes for apprentices (Heyvaert et al., 2017). This inductive approach allows for theory generation (Dixon-Woods et al.).

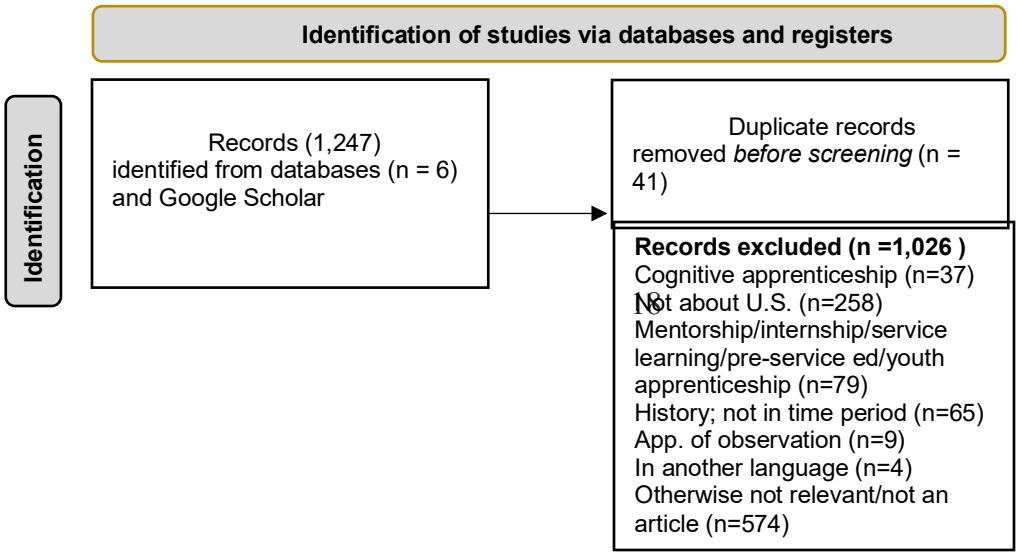
Search strategy and data screening

I began by defining search parameters and completing exploratory searches. My initial review identified many conceptualizations of apprenticeship (e.g., unregistered youth apprenticeship, pre-apprenticeship, internships and mentoring arrangements, etc.). These models, while usually sharing several of the components, do not offer all the benefits of structured and regulated RA, such as guaranteed employment, wage progression, the pairing of classroom-based and on-the-job training, and industry-recognized certification. In order to learn about the complex interplay of RA's structural and programmatic elements, curriculum and instruction, and a particular learner population – that is, adult U.S. apprentices employed in an apprenticed occupation – I limited my investigation to registered apprenticeship.

I prepared an initial protocol with a data extraction form and developed a search strategy that culminated in the use of *apprentice** in the subject, and *United States OR America OR USA OR U.S.* in any part of the text. To narrow the focus, I excluded papers that included the term *cognitive apprentice**. I limited the search to articles published between Jan 1991 - Feb 2021, a

30-year time period that has seen much societal and economic change in the U.S. The databases I searched were Education Research Complete, APA PsychInfo, CINAHL Complete, MEDLINE, and Business Source Complete. I followed this library search with two Google Scholar searches on the terms *apprenticeship* and *registered apprenticeship AND United States* from 1991-2021 and used the first 300 citations from each search (Haddaway et al., 2015). After the removal of duplicates, I had an initial set of 1,206 articles. My search yielded gray and practice literature, such as technical reports, white papers, and dissertations, which I included in order to comprehensively map the domain and avoid publication bias (Kitchenham, 2004). It is important to note that much important research on apprenticeship in the U.S. is funded by federal contracts, so technical reports and papers are a major source of information on this topic.

Next, I reviewed titles and abstracts using my initial inclusion and exclusion criteria, leaving 182 sources, 62 of them scholarly and empirical. My final eligibility criteria were (a) empirical research, (b) registered apprenticeship, (c) data from the United States, (d) published between January 1991 and February 2021, and (e) published in or translated to the English language. Articles were excluded if they instead reported (a) forms of apprenticeship other than registered apprenticeship, (b) apprenticeship history, or (c) conceptual, advocacy, or journalistic articles. I read each of the articles, applying these eligibility criteria. Reading and the scholarly review process led to the inclusion of several additional eligible articles, garnered from reference lists, which had not been identified in initial searches. This screening resulted in my sample of empirical publications for analysis: 36 peer-reviewed articles and 98 non-peer-reviewed articles, technical reports, white papers, and theses. A PRISMA flowchart (Page et al., 2021) that depicts the process of identification, screening, and inclusion of studies may be found in Figure 2.1.



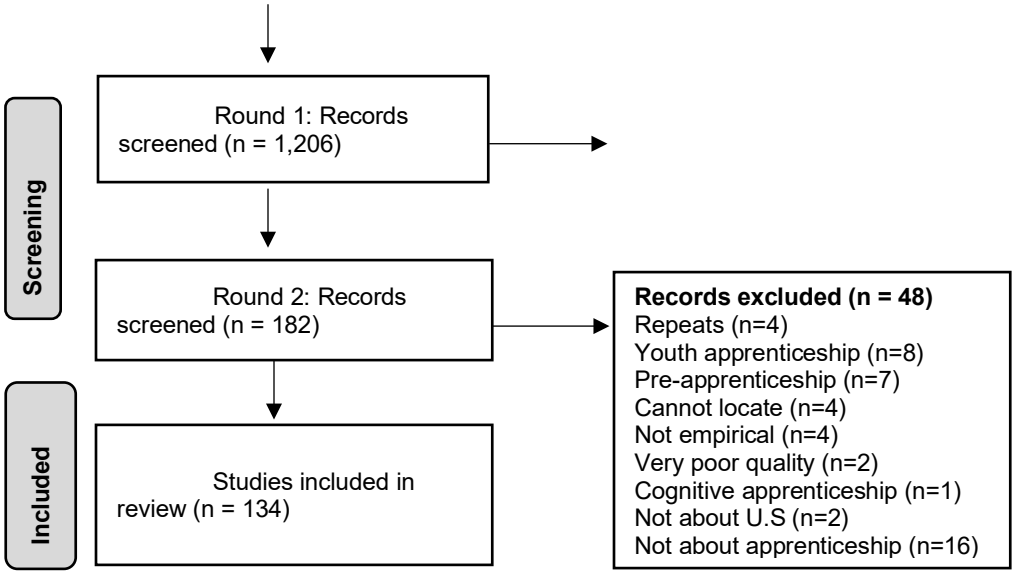


Figure 2.1 Preferred reporting items for systematic reviews and meta-analysis (PRISMA)

Data Analysis

Using a thematic analysis approach (Braun & Clarke, 2006), I familiarized myself with the data by reading and re-reading all of the papers and recording initial analysis notes in my review diary. I generated initial codes from the peer-reviewed articles and inductively derived themes and subthemes from the data. Then, I reviewed these themes by checking them against the coded extracts of the entire data set, including the empirical papers from the practice literature, to refine the analysis.

Lincoln and Guba (1985) encouraged the enhancement of qualitative studies' trustworthiness by establishing their confirmability, credibility, and transferability. I contribute to confirmability in this study by listing all included studies in the Appendix A, so other researchers may confirm my findings. To enhance credibility, another educational researcher selected and examined three studies in the scholarly research sample and compared them to my data extraction form. The researcher agreed with my categorization and analysis of the studies. A research synthesis approach contributes to the transferability of findings through the analysis of a

large number of studies that span a 30-year period and through the rich description generated through thematic analysis. My diary of review choices further enhanced trustworthiness by establishing an audit trail (Carcary, 2009).

Results and Discussion

I identified three themes: expansion (n = 14 scholarly and 49 practitioner sources), benefits (n = 18 scholarly and 49 practitioner sources), and outcomes for minoritized groups, including women and people of color (n = 13 scholarly and 32 practitioner sources). The analysis also uncovered attending questions and gaps in the literature. Below, I summarize and discuss each theme, then share questions, gaps, and implications related to learning. With the exception of illuminating recent statistics from the National Skills Coalition (2020) and selected recent reports from the U.S. Department of Labor, all papers cited in the discussion of themes are those identified in my set.

Theme 1: Expansion

The first theme relates to the status of registered apprenticeship in the United States. Three sub-themes comprise this theme: (a) increasing popularity, (b) changes in mindset, and (c) expansion to service occupations. This theme raises questions about the promotion of retention, completion, and higher wages in new RAPs and questions about learning.

Increasing popularity. RAPs serve a very small number of workers in the U.S., relative to the approximately 19.4 million students enrolled in higher education in 2020 (National Center for Education Statistics, 2021) and to the ubiquity of apprenticeship in many European countries (Decker, 2019; Gospel, 1994; Lazaryan et al., 2014). In 2020, less than 0.2% of U.S. workers were current apprentices. There are currently over 600,000 active registered apprentices in the United States and numbers of new apprentices have increased 70% since 2011; over 13,500 new RAPs were created between 2015-2020 (U.S. Department of Labor, 2021). It is important to note that over 100,000 of these are military apprentices, and therefore do not contribute to the number

of civilian apprentices available to the labor force (U.S. Department of Labor, 2021). RA is increasingly touted by the federal government and public policy organizations as an answer to secondary and postsecondary education systems that do not produce enough workers to fill available middle-skill jobs. RA is held up as an affordable training and career advancement opportunity for adults with less than a college degree (Amoyaw & Brown, 2018). Indeed, a majority of Americans have favorable views of apprenticeship and support increases in government funding for these programs (Snell et al., 2017).

Changes in mindset. Yet, RA is often presented in U.S. society as a second-rate alternative for students who are not perceived as college-ready or cannot afford it (Workman, 2019). Strong emphasis on a college degree coupled with the decline of labor unions and U.S. employers' wariness of organized labor, has created a situation in which few young people are aware of apprenticeship as an option and dissuaded from pursuing it if they are aware (Gospel, 1994; Rossmeier, 2015). These social barriers are accompanied by structural barriers. For example, Craig and Bewick (2018) note that Pell Grants, which assist lower-income students to afford college, cannot be used by apprentices whose RTI is provided by a community college. In response to these issues, several papers encouraged a shift in the way students, parents, and our broader society view apprenticeship, citing successful apprenticeship systems in Europe as evidence for their arguments (Browning & Sofer, 2017; Cai, 2018; Craig & Bewick, 2018). Decker (2019) found technical college students wanted their secondary and postsecondary institutions to provide more information about apprenticeship, particularly since it is so much less costly than college, and to contribute to a reduction in stigma around apprenticeship.

Expansion to service occupations. Most U.S. apprentices are still concentrated in the building and skilled trades (Sharp & Dvorkin, 2018; U.S. Department of Labor, 2021). As a majority of the papers reported on one or more of these trades, most of what we know about RA in the U.S. is from the skilled trades context. Today, the RA model is also expanding into many new industries, such as tech and STEM fields (Gaudet et al., 2010; Kuehn & Jones, 2018; Kuehn et al., 2019; Sharp & Dvorkin), the insurance industry (Cheney, 2017), transit maintenance

occupations (Glover et al., 2007) and early childhood education (Copeman Petig et al.., 2019; Uttley & Horm, 2008; Workman, 2019). Hecker & Kuehn (2019) encourage the expansion of RA within the U.S. prison system. RA has also made substantial inroads into the public sector. Thirty years ago, RAPs were uncommon in training for public sector jobs (Riccucci, 1991) and today, RAPs in public administration boast the second largest number of active apprentices (U.S. Department of Labor, 2021). The United States Military Apprenticeship Program (USMAP), comprising around 180 occupations within the U.S Navy, Marine Corps, and Coast Guard (Hanson & Lerman, 2016; Lerman et al., 2015), saw its large number of active apprentices more than double between 2008 and 2020 (U.S. Department of Labor, 2021).

However, the area of RA expansion most salient in the literature review was into the service sector (Browning & Sofer, 2017; Dimeny, 2019; Jopson et al, 2019; Kuehn, 2019; Mauldin, 2011). Defined broadly, service industry occupations include retail sales; frontline healthcare practitioners like nurses, nurses' aides, and personal care assistants; cleaning and maintenance; and food preparation. The diverse workers in these positions are often referred to as frontline workers because they perform hands-on, essential tasks on the front lines of service-sector industries, often dealing directly with the public, representing their employer to others, delivering services or doing hands-on manual work, and juggling the needs of multiple stakeholders (Nichols et al., 2016). Approximately 32% of the U.S. workforce, or around 48 million people, are frontline workers (Bergson-Shilcock, 2017). In a study on apprenticeship diversity and expansion that falls outside this review's inclusion criteria, Reiter et al. (2021) found that 27 states used federal grants to target healthcare or biotechnology for apprenticeship expansion.

What contributes to retention, completion, and higher wages?

Many studies encouraged increasing the number of RAPs in the U.S. to address major economic and social problems, such as youth unemployment, the middle skills gap, and income inequality (Becht, 2019; Browning & Sofer, 2017; Koller, 2018). However, relatively few

studies presented scholarly research on the design features of apprenticeship that contribute to retention, completion, and higher wages, much less mobility along a career path.

Studies show that despite the increasing popularity of RAPs in the U.S., less than half of participants complete their programs and retention rates are low (de Alva & Schneider, 2018; Hanson & Lerman, 2016; Lerman et al., 2015; Reed et al., 2012; U.S. Department of Labor, 2021). Among low-wage service workers, relatively short, joint programs had more completers (Kuehn, 2019). Berik and Bilginsoy (2000) note that limited data and anecdotal evidence suggest that quitting apprenticeship is largely voluntary on the part of the apprentices, as reasons given included failure to pay union dues, show up for work, or attend classes. Much rarer were instances of involuntary quits due to failed drug tests or fights. In the USMAP program, factors contributing to quits included changes in posts of duty and poor initial communication about the nature of the RAP, possibly leading to high levels of attrition early in the program, and low perception of the value of the training among apprentices (Lerman et al., 2015). In a dissertation study, Swegle (2017) identified financial issues such as layoffs, lack of reliable transportation and one's own tools, and poor money management as primary reasons for quits. They also identified poor attitude and work ethic as primary causes of attrition. Conversely, Browning & Sofer (2017) attested to successful practices that reduced barriers to apprenticeship for opportunity youth, such as waiving the requirement for a car and wait periods to re-take exams, and appointing mentors who can help younger mentees deal with work-related frustration and provide other individualized supports. When it comes to higher wages, Kuehn (2019) concluded that longer RTI and training with the apprenticeship sponsor (as opposed to with a community college) correlate with higher exit wages among service workers. Outside of these disparate findings, which suggest some design implications, the literature is inconclusive on what elements contribute to increased retention, completion, and higher exit wages. This gap in the literature raises the concern that apprenticeship is expanding without a research foundation that points to the design elements that contributes to successful apprenticeship. This fact is likely due to the lack of federal and state data collection on these particular features. It is also likely due to the fact that educational researchers have not focused much attention on apprenticeship as it is

practiced in the U.S. Because apprenticeship researchers are most often economists and workforce development evaluators, the majority of research on apprenticeship has focused on the impacts and benefits of apprenticeship on employment, earnings, and other economic and employer-related outcomes. Addressing this gap in the literature will require educational researchers to take more interest in this model of workforce learning.

As RA expands, what features of new RAPs promote learning?

Much of adult learning theory tell us that people learn by doing (Brown et al., 1989; Lave & Wenger, 1991). In apprenticeship, the combination of active OJT for which apprentices are paid, reinforced by in-class theoretical instruction that prepares the worker for life-long learning in a dynamic industry, can result in "education that transcends the textbook and extends to physical and even cultural learning" (Rossmeier, 2015, p.1). However, due to the lack of state and federal data collection on these topics, the reviewed studies are largely silent on which design and programmatic elements contribute to learning in RA and how they do so. This is partially due to the unique position of RA in the United States and underlines why researchers cannot always draw on studies conducted about overseas contexts to inform RA design at home. Though RA is regulated loosely by federal and state government agencies, it is an employer-led and largely decentralized system. Individual U.S. apprenticeship programs can have their own content and quality standards, which can make programs difficult to compare to each other. Unlike European systems, which incorporate a strong social partnership between industry and education at the national level, RAPs are often wholly separate from the secondary and post-secondary educational system. Moreover, proprietary RA curricula and approaches are often quite guarded, so educational researchers do not have ready access to them in order to conduct studies that would shed light on the benefits or drawbacks of instructional practices and curricular approaches. These realities hinder expansion and create the risk that RA expands in the U.S. without enough knowledge about how to optimally design these experiences for learning, particularly among diverse, frontline service workers.

Theme 2: Benefits to society, economy, apprentices, and employers

The second theme summarizes the benefits of the RA model, organized by three sub-themes: (a) benefits to society and economy, (b) benefits to apprentices, and (c) benefits to employer. This theme raises questions about how learning is promoted in RAPs.

Benefits to society and economy. Over half of all jobs in the United States are described as "middle skill"—that is, requiring more than a high school degree but less than a bachelor's degree—but only 43% of workers are able to access training for these occupations (National Skills Coalition, 2020). The term middle skill can be misleading, as it can be interpreted as disparaging of workers' knowledge and abilities. That is not how it is used here; instead, it is meant to refer only to the amount of education typically required to obtain and persist within these occupations in the U.S. I found frequent references to this middle skills gap and the promise of apprenticeship for upskilling the service workforce, replacing retiring Baby Boomers, and addressing unemployment, particularly among those with lower levels of education (Beer, 2019; Bosch & Charest, 2008; Crewe, 2020; Decker, 2019; Hanson & Lerman, 2016; Lerman et al., 2020; Shaw et al., 2019). Several authors pointed out that youth unemployment in the U.S. is high relative to Europe and that apprenticeship could help disadvantaged young people find more success in a job market where employers seek experienced workers (Ayres, 2014; Boi, 1993; Messing-Mathie, 2015).

The literature identifies social benefits as well. In a cost-benefit analysis of RA in 10 states, Reed et al. (2012) not only found that RA worker productivity was higher, but also that RA participants used social safety net government programs such as welfare, food stamps, and unemployment insurance less, particularly when tracked over a participant's career. Evaluation studies of early educator and child development RAPs found better classrooms and positive outcomes for young children (Uttley & Horm, 2008) and perceptions of higher quality of childcare and engagement with parents (Copeman Petig et al., 2019). Becht's (2019) findings suggest apprenticeship expansion can reduce income inequality.

Benefits to apprentices. Nearly all apprentice completers (91%) maintain or find employment after completion (Helper et al., 2016). RA participants earn substantially more than nonparticipants (Berik & Bilginsoy, 2006; Hanks et al., 2018; Kuehn, 2019; Manzo, Manzo, & Bruno, 2019; Reed et al., 2012). Hollenbeck and Huang (2016) found that RA had a greater impact on future earnings than any other workforce training program in Washington state; though outside the study's time parameters, more recent return-on-investment research in Washington has reinforced these findings, showing that apprentices earn over $30,000 more after exiting their RAP than they would have if they had never participated (Dula, 2021). The low-wage frontline worker population (Kuehn, 2019) is particularly well-positioned to benefit from the growth and expansion of RA, as it is much less costly than a traditional college education, provides an industry-recognized credential at completion (Lerman, 2016a), leads to permanent employment (U.S. Department of Labor, 2021), and more opportunities for advancement (Lerman et al., 2014) after completion.

Benefits to employers. Employers who sponsor apprenticeship invest significant resources into worker and instructor pay, materials, and overhead, but research indicates they reap a substantial return on their investment. Benefits to employers include higher levels of performance among apprentices, including increased productivity, flexibility, and enhanced problem-solving ability (Helper et al., 2016); reduced turnover and improved recruitment (Payne, 2016); a ready-made pipeline of skilled, enculturated, engaged, and loyal employees with less need for supervision and a reduction in overtime costs (Helper et al.; McCarthy et al. 2017). RA has also been shown to improve workers' soft skills, quality of care and patient outcomes, and increase client satisfaction when implemented in the service industry (Helper et al.; Lerman et al., 2014; Love & McCarthy, 2018).

What should be the role of community colleges in RA?

The articulation between the secondary and postsecondary education systems and the RA system is weak in the U.S. in comparison to the European apprenticeship powerhouses, such as

Germany and Switzerland. While community college partnerships are increasingly relied upon to provide the RTI component of RAPs (Beer, 2019), and the practice literature encourages this reliance (McCarthy et al., 2017), research on the benefits of this practice has been contradictory. Partnership with community colleges can have many potential benefits, including a reduction of sponsors' costs, since expenses related to materials, curriculum development, recruitment, and instruction could be shared with the public educational system (Helper et al., 2016). Such a partnership can also benefit apprentices by offering them college credit that is aligned with degree programs (Workman, 2019). Cantor (1994, 1995) analyzed factors that contributed to successful partnerships with community colleges and Navy apprenticeships, concluding that collaboration was successful when it provided access to funding the parties could not obtain on their own and when it was structured to allow for the mediation of conflicts. Fuller (2016) found that completion of RA within the community college system in California leads to higher wages over time and the probability of employment in one's chosen industry after completion. Authors of several studies in the practice literature encouraged connecting RA to the higher education system in order to expand the model, improve outcomes after completion, and reduce students' financial burden (Beer, 2019; McCarthy et al; Welton & Owens, 2017). Community colleges may also be able to contribute to the diversification of apprenticeship through their existing community-based recruitment mechanisms, their experience serving non-traditional students with barriers (Messing-Mathie, 2015), and through strong partnerships with local employers, ultimately contributing to the expansion of apprenticeship, particularly in the service industry (Beer, 2019; Doty & Odom, 1997). Model programs in states such as South Carolina (Lerman, 2016b) spotlight effective partnerships with community colleges, which provide instructional technology and bring students to apprenticeship with local employers at a fast clip.

However, others warn that partnerships with community colleges can have drawbacks. Kuehn's (2019) quantitative study found that partnerships with community colleges resulted in reduced RAP completion rates and were associated with lower exit wages for some service occupations. Other challenges to partnering with community colleges include a lack of flexibility on degree program credit requirements, slow and unsystematic change mechanisms within

colleges, and the heavy lift required for college commitment to RA, including equipping classrooms with appropriate technology, building strong relationships with local employers, and hiring qualified instructional staff with industry expertise (de Alva & Schneider, 2018; Gunn & De Silva, 2008; Nehls, 2019). Limited and disconnected federal and state funding for postsecondary education and apprenticeships, ongoing cuts to federal workforce training programs, and difficulties overcoming the traditional separation in the U.S. between education and business, all potentially hinder the success of community college involvement in apprenticeship (Beer, 2019). In addition, there is concern that some of the benefits that community colleges offer to RAPs, including their ability to develop curricula, support instructors, and offer college credit to apprentices, lead to higher costs that will be passed on to the apprentice, undercutting one of the key benefits of apprenticeship to many disadvantaged learners; that is, the low cost (Prebil, 2019).

On what evidence do we base our assumptions about the learning benefits of RA?

Many of the studies in the practice literature are evaluative and point to positive outcomes for different groups, but stop short of the design and educational research that would help the field understand what combination of elements can lead to these desired outcomes. For example, Copeman Petig et al. (2019) found in an evaluation of early educator apprenticeship programs that apprentices report learning valuable knowledge and skills in their apprenticeship, greatly improving their practice with children and families and the quality of care. But the study does not describe the apprentices' learning activities that led to these benefits.

Many of the reviewed studies do provide limited insights on what promotes or creates conditions for learning, but the studies are so distinct from one another in context, learning population, and purpose that it is difficult to draw conclusions for RA design. For example, in their analysis of benefits and costs of RA for businesses, Gaudet et al. (2010) evaluated a geospatial technology apprenticeship program, concluding that apprentices passed skills tests and perceived course work as relevant, suggesting some learning occurred, but the authors do not

venture guesses as to why. In a small, quantitative study of electrical industry apprentices and instructors, researchers found evidence that respondents reported higher occupational work ethic than other study contexts in which their instrument had been used, but the author did not offer an explanation for why or how (Hatcher, 1995). Porter et al. (1997) analyzed predictors of success in a medical service apprenticeship course in the Air Force and concluded that certain scores on select parts of the screening test were more predictive of success but used these findings only to recommend minimum test scores for admission into the RAP. Gordon (2003) surveyed apprenticeship instructors and reported the principal finding that beginning instructors were less likely to feel that they were effective teachers than those with more experience.

On the other hand, several studies suggested promising directions for future educational and design research. Several of these concluded that the experienced mentor, a key feature in any RAP, played an important role in apprentices' learning and development, supporting the development of attitudes toward unions (Fullagar et al., 1992), in the outcomes for children served by child development specialist apprentices (Uttley & Horm, 2008), and for opportunity youth in healthcare apprenticeships (Browning & Sofer, 2017). In addition, Helper et al. (2016) found that apprenticeships led to greater creativity and problem-solving ability and enhanced flexibility in completing tasks for apprentices, surmising that this is owed partially to the dual RTI and OTJ components of the model, which create a strong foundation for understanding of the principles of the work. The role of RTI in learning, behavior modification, and reduction of injuries was highlighted in a mixed methods study by Kaskutas et al. (2010) that detailed the development of safety training to reduce falls from heights in the residential construction industry and reported favorable evaluations from apprentices. In that program, designers introduced enhanced safety practices in RTI before workers went to the job site and reported that they infused their instructional approach with attention to adult learning principles, problem-solving activities, authentic practice, and role-playing. Unfortunately, the authors gave very few examples of these approaches. In a report on the outcomes of a survey and interviews with employer sponsors, Colborn (2015) pointed out that curriculum was often designed by staff that work the job and thereby identify the skills to be taught, while Craig and Bewick (2018) criticize

the siloed design approach that results in very different curricula in similar programs, with no standardization. A small study in the practice literature by Johnson and Lambeth (2017) recommends shortening the time delay between the demonstration and practice of a skill in a stagecraft RAP, advocating for teaching technical skills in small steps.

A few studies identified barriers to learning. Uwakweh (2006) surveyed construction apprentices and found that their motivation to proceed as apprentices was low and that they did not perceive value in their program, concluding that managers did not do enough to support and incentivize apprentices' learning and retention; these findings were echoed by Hanson and Lerman (2016). Byrd (1999) discusses how women carpentry apprentices can feel marginalized in RTI classrooms by the competitive learning culture that values previous experience and the jargon, cursing, and off-color jokes used by the men.

At their core, RAPs are learning experiences. Their purpose is to support the learning of job-related skills and knowledge, guiding new workers through a structured experience that brings them closer to full participation in their chosen occupation, their community of practice. The reviewed studies highlight the benefits of RAPs for society and the economy, employers, and apprentices themselves. However, due to the fact that educational researchers have not focused on apprenticeship, we do not yet have many studies that investigate the specific design elements these learning experiences should have in order to ensure these benefits.

Theme 3: Outcomes for Minoritized Groups

Many more men than women are registered apprentices, and whites comprise the largest racial group in RAPs (U.S. Department of Labor, 2021). , though their percentages in RAPs are slightly lower than their presence in the population as a whole (Reed et al., 2012). In this theme, I explore the research on outcomes for groups that are minoritized in RA through two subthemes: (a) different outcomes in joint- and non-joint programs, and (b) outcomes for women and other marginalized groups. I use the term minoritized to refer to groups of people that have been historically disenfranchised or pushed to the margins mainstream U.S. society with economic

consequences. In my use of the term, I do not refer to sizes of demographic groups in the population. In this paper, I refer principally to women, workers of color, those with foundational skills gaps who are or may be at an economic disadvantage. This theme raises questions about how the learning needs of frontline service workers, disproportionately members of minorized groups, are addressed in RAPs.

Different outcomes in joint- and non-joint programs. RAPs can be differentiated by types of sponsorship. The majority of registered apprentices in the U.S. are in RAPs sponsored jointly by labor unions and employers (U.S. Department of Labor, 2021). These are *joint* programs. *Non-joint* RAPs are not sponsored by joint labor-management organizations. There are many more non-joint programs, but they train a smaller share of apprentices overall (U.S. Department of Labor, 2021). One of the most salient findings from my analysis was that joint programs have generally better outcomes, including the highest exit wages (Kuehn, 2019), higher enrollments, longer programs and higher completion rates, and lower attrition rates than non-joint programs (Argyres & Moir, 2008; Bilginsoy, 2005; Bilginsoy, 2007; Bilginsoy, 2018; Bradley & Herzenberg, 2002; Public Sector Consultants Inc., 2017). Joint programs have a well-established track record of emphasizing quality and safety and successfully preparing apprentices for stable careers (Nehls, 2015).

Outcomes for women and other marginalized groups. These better outcomes extend even to non-traditional apprentices. In joint programs today, a larger share of apprentices are women and members of minoritized groups, and these groups have much better outcomes than in non-joint programs (Argyres & Moir, 2008; Berik & Bilginsoy 2000; 2002; Olinsky & Ayres, 2013). Building trades unions' reputation as historically discriminatory against women and other minoritized groups is well earned. However, today, after considerable regulatory intercession, joint construction RAPs have significantly better completion rates for these groups than non-joint construction RAPs have overall for all groups combined, including white men (Glover & Bilginsoy, 2005).

This track record for joint programs is an important finding because historically, women are rare in RAPs compared to white men, particularly in the building trades (Berik & Bilginsoy, 2000; Byrd, 1999; Eisenberg, 2018; Riccucci, 1991). In 2020, there were 25,367 active female apprentices, compared with 249,957 active male apprentices (U.S. Department of Labor, 2021). In the 1970's, antidiscrimination policies attempted to promote more participation by women in these programs, but with very limited success. and vehement opposition by trade unions and employers. Though enforcement was weak or non-existent during the Reagan era of 1980-1988, the representation of women in nontraditional occupations has been rising since the 1970's, it has nonetheless barely changed in the construction industry has barely changed since then (Eisenberg, 2018) and studies show a pattern of decline (Berik & Bilginsoy, 2006). Barriers for women abound. Reports of severe discrimination, isolation, harassment, and violence against women in trades apprenticeship programs have been common for decades, and women of color report racism (Bower, 2007; Byrd, 1999; Eisenberg, 2018). It is no wonder that women are less likely to complete skilled trade RAPs than men (Berik & Bilginsoy 2000; Reed et al., 2012). Despite barriers and occupational segregation, many women remain determined to participate due to RA's potential for quality training, career advancement and higher wages (Bower; Berik & Bilginsoy, 2006), and they recommend that RAPs promote access for women through outreach and information, support the development of foundational skills to help them succeed in the apprenticeship, assist with childcare and peer support, and better address the harassment they experience on worksites that are dominated by men (Byrd; Reed et al.). Berik & Bilginsoy (2000) place the responsibility for eliminating barriers in joint programs with the unions, noting it "requires vigilance to change the present discriminatory practices and sexist attitudes" and that "their resources and mechanisms ought to be strengthened and put into use to promote equity" (p. 61).

Outside of the trades, newer apprenticeships in early education, frontline healthcare, and service occupations are much more successful in recruiting and retaining women (Workman, 2019), perhaps because many of these care jobs are historically performed by women. In an evaluation study of joint early educator apprenticeships in California, Copeman Petig et al.

(2019) found that 98% of apprentices were women and nearly all of color. In a study of inclusion in apprenticeship, Kuehn (2017) found that the share of women in South Carolina RAPs, particularly those in non-construction occupations, was high compared to the national average due to systematic efforts by policymakers to promote diversity.

While women received the most attention in the RA literature, the experiences of other minoritized groups are also the subject of research. Building trades unions have had an ugly history of exclusionary behavior toward Black workers and other workers of color (Penn, 1998). Starting in the 1969's, the proportion of Black and Hispanic workers in trades apprenticeship programs has increased, owing partly to civil rights legislation, but overall progress has been modest. Today, Hispanic workers have particularly high representation in the building trades apprenticeships, while nearly a quarter of apprentices in service occupations are Black (Kuehn, 2019). These groups' overall trade union participation rate stands at less than 15% (Helper et al., 2016).

Reflecting longstanding systemic inequities, apprentices in prison RAPs are more likely to be Black (Hecker & Kuehn, 2019), and while completion rates are slightly higher, wages are much lower, and some apprentices in prison are not paid at all (McGrew & Hanks, 2017). Authors advocate for expanding RA in prisons accompanied by higher wages, because RAP participation can facilitate justice-involved individuals' access to jobs after release and significantly reduce recidivism (Saylor & Gaes, 1997).

Mollica's (2020) analysis of interviews with ESL teachers, program staff, and thought leaders led them to conclude that few English language learners participate in RA and encouraged the use of pre-apprenticeship programs and inclusive training models to contribute to a more diverse and qualified workforce. Indeed, in a study that falls outside this review's inclusion criteria, Copson et al. (2021) observed that federal grantees used pre-apprenticeship programs to promote access to apprenticeship for marginalized groups. Browning & Sofer (2017) explored positive outcomes for opportunity youth in urban RAPs, praised the ability of

these programs to connect this population to marketable skills, certification, and employment, and recommended attention to young people's social-emotional development in design.

How are new RAPs designed for frontline service workers?

Frontline workers face a number of barriers to participation in education and training. Understanding these barriers and what research in adjacent fields tells us about how to address them are two steps in facilitating the expansion of apprenticeship to the service and healthcare industries. In an analysis of The Organization for Economic Cooperation and Development (OECD) Survey of Adult Skills, Bergson-Shilcock (2017) found that 62% of service-sector workers have limited literacy, 74% have limited numeracy, and 73% have limited digital problem-solving skills. This is despite the fact that their frontline positions require the use of these skills; hence, workers who lack these skills tend to have less mobility and lower wages and are more likely to end up unemployed (Ross & Holmes, 2017). These workers also face systemic discrimination as predominantly members of marginalized groups and they are not offered learning and development opportunities by employers with the same frequency that these are offered to more highly educated, higher-wage employees (Devins & Gold, 2014; Hedayati-Mehdiabadi & Li, 2016; Institute for Corporate Productivity, Aspen Institute, & Upskill America, 2016). In addition, frontline workers are less likely to take advantage of training opportunities when they are offered (Fouarge et al., 2013; Kyndt et al., 2011). Illeris (2006) found that negative past educational experiences can lead to a lack of self-confidence in these workers, which discourages further learning, while societal stigma associated with low basic skills can further discourage adults from admitting need and seeking support (Windisch, 2016). In addition, because low-paid, low-skill frontline work is perceived as low-quality, repetitive, and offering few opportunities for advancement, these workers themselves often do not see a need to engage in training. They often have less free time, access to transportation, and money that further education and training would require, which further disincentivizes participation (Lloyd & Mayhew, 2010). When they do participate in adult education programs and workplace training, dropout rates are high (Windisch, 2016).

These barriers strongly suggest the need for evidence-based approaches to effective designs for learning for these workers, for whom RA may be a particularly beneficial approach. Kuehn (2019) found that apprenticeship leads to advancement and higher exit wages for service workers, is affordable in comparison to college (Amoyaw & Brown, 2018), and can promote the development of interpersonal, communication and other "soft" skills that are especially useful in customer service-oriented industries (Lerman, 2016a). Since dropout rates are high among the frontline worker population, understanding how these workers build confidence and positive learning and occupational identities can help us design RAPs that emphasize retention, encouragement, and support, leading to higher rates of completion. In short, while apprenticeship is a useful model for many jobs and skill levels, RA can be a particularly practical and accessible path to middle skills occupations – and the middle class – for millions of low-wage service workers. U.S. literature on RA in the last 30 years provides few insights on how to design curriculum and programs to meet the learning and support needs of this large and in-demand group of workers.

Conclusions and Implications

In summary, through analysis of 134 empirical publications on the topic of registered apprenticeship in the United States over a 30-year period, I identified three themes (1) RA has been and continues to expand, including to frontline workers; (2) RA benefits employers, employees, and society despite costs by providing increased wages and stability; and (3) marginalized groups disproportionally benefit from but lack access to RA. The analysis also revealed that, due to lack of federal and state data collection on these elements and the orientation of apprenticeship researchers to economic outcomes, the reviewed studies offered little insight about how specific RAP design components contribute to apprentice retention, program completion, attainment of higher exit wages, and learning itself. The studies were notably ambivalent about the benefits of community college partnership and inconclusive regarding what designed elements support frontline workers in particular, an issue given the increasing expansion of RA for frontline workers.

The results of this analysis have both practical and scholarly implications. Apprenticeship sponsors may benefit from the insights on the ongoing expansion of the model into new industries and find reason to invest resources into its development, justified in their decision by research on the benefits for employers, apprentices, the economy, and meaningful social outcomes. Educators, instructional designers, and economic and program development professionals may take lessons from U.S.-based research on the barriers experienced by women, marginalized groups, and those with foundational skills gaps and use this enhanced understanding to create RAPs that are more accessible and equitable. Given the substantially better outcomes for all apprentices, particularly women and minoritized groups, in joint programs and the ongoing diminution of the U.S. labor movement, results of this analysis may also encourage practitioners to take a long look for inspiration and guidance at the educational and training practices that U.S. unions have honed over more than a century.

This analysis has revealed a deep gap in our knowledge of the design elements that contribute to learning, promote the development of agency and professional identity, and support success for all apprentices, including but not limited to those in frontline service and healthcare occupations. This systematic literature review showed that some researchers view learning and success in the apprenticeship context through a variety of different lenses, such as human capital theory and transformational learning theory (Howze, 2015); program theory (Hunt, 2020), and expectancy theory (Uwakweh, 2006), among others. However, most papers presented no perspective on how learning or identity development occurs in RA. Theory tells us that apprenticeship promotes learning. The model is social and experiential, providing ample opportunities for situated practice in authentic, on-the-job contexts, guided by experienced mentors (Brown et al., 1989; Lave & Wenger, 1991). In addition, RA seems particularly well-suited to workers with foundational skills gaps who may prefer hands-on, active learning to a traditional classroom. Unfortunately, the designs of the RTI and OJT components of RA are rarely described in detail in existing research, leaving scholars with an impoverished understanding of how they work together with other programmatic elements to promote learning and success for apprentices.

Moreover, very few studies approached the development of agency, confidence, and professional identity among apprentices, though decades of educational research have indicated a fundamental relationship between workplace learning and the development of these characteristics (Cruess et al., 2018; Freire, 1970; Lave & Wenger, 1991; Tett, 2016; Toom et al., 2021). Scholarly work on the development of professional identity in apprentices has been carried out in non-U.S. contexts (Chan, 2013; Duemmler & Caprani, 2017). For instance, Copeman Petig et al. (2019) found that nearly all surveyed apprentices reported more confidence in their roles as early educators as a result of their apprenticeship program and felt more likely to continue as an educator. Their responses indicated a growth in their sense of being a valued professional in a career field. The gap in our understanding of the development of apprentices' agency and identity points to a need for scholarly research that could shed much light on effective designs for learning in apprenticeship.

The several gaps in our understanding of how learning and identity development happen in RA impact our ability to design effective programs. As the model expands into new occupations and is used with apprentice populations who have different needs and barriers, RAP sponsors and designers necessarily adjust the model to fit these new contexts. With such sparse knowledge about what promotes learning in RA, we risk sacrificing those elements that have contributed to the model's persistence and success.

Theories of learning are useful because they give us a way to make sense of phenomena we observe. A theoretical lens helps us understand and explain what happens in apprenticeship, make decisions about program design, curriculum, and instruction, and predict outcomes. If we have no perspective on learning, if our approach does not arise from a point of view, we have very little basis on which to make decisions as we design an apprenticeship program, which is at its core a learning experience. Each sponsor or instructional designer thus begins essentially from scratch, building programs that reflect idiosyncratic understandings of how learning occurs and is supported, instead of being guided by well-developed theories based on analysis of research and practice in adult learning and the learning sciences.

I propose that RA practitioners become familiar with two social theories of learning that have explanatory power for the elements and outcomes of apprenticeship that were most salient in this literature review and analysis. The first is Lave and Wenger's (1991) theory of situated learning and communities of practice. This theory presents a framework for how people learn and reflects a view of learning that is not merely the cognition of the individual, but instead is a fundamentally interactive and participatory process that is situated; in other words, it is meaningful to the extent that is relevant to and reflective of the authentic activities of daily life for those learners. In this theory, learners participate in communities of practice, which are groups of people that share a common set of understandings, interests, or problems and work together toward common goals. Through a process called legitimate peripheral participation, new community participants gradually move from the periphery of the community to its center, toward full participation in the community. The theory of situated learning and communities of practice naturally reflects some of the most intriguing aspects of apprenticeship as a learning model, including its highly situated nature, learning in an authentic occupational context and necessarily among knowledgeable members of a community that guide an apprentice to full participation over time. Among the design decisions this theory could guide are choices of learning activities in both RTI and OJT.

A second social theory of learning that can inform apprenticeship design is cognitive apprenticeship (Brown et al., 1989). In this theory, knowledge is fundamentally situated; it cannot be abstracted and separated from the situations in which it is used. Learners construct meaning together through social interaction and interaction with the material world through authentic tools and tasks. Learning is a form of enculturation, and cognitive skill acquisition is guided by coaches or master teachers (Collins et al., 1989). The theory of cognitive apprenticeship can provide rich insights into the process of mentorship in RA, among many other design decisions.

These social theories of learning contribute a perspective on the development of identity as well. For Lave and Wenger (1991), learning itself entails the development of identities, which

they define as “long-term, living relations between persons and their place and participation in communities of practice” (p. 53). The movement to full participation in the community is the most salient characteristic of learning. Through learning, the individual changes fundamentally; they view themself differently and are viewed differently by others. Identity changes slowly; participation in the community and the journey from novice to expert is an ongoing and transformative process. This theoretical viewpoint has implications for the types of experiences we prioritize in our apprenticeship designs, and the time we allow for them, if we want to contribute to the evolution of the individual as a full community participant.

Limitations and future research directions

The findings of any research synthesis are limited by the studies selected for inclusion and the quality of those studies. I did not include research on unregistered apprenticeships, which may had led me to miss key innovations present in this diverse group of apprenticeship programs. I also did not include a systematic analysis of study quality as part of my inclusion criteria; as such, I may have included some studies of low quality. In combining results from many studies that used different theoretical approaches and methodologies, I ran the risk of sacrificing some rigor and transferability of findings. In addition, it is possible that my somewhat emergent review protocol led to missing some studies which would have enhanced or contradicted my findings.

More empirical research must be carried out on the impacts of apprenticeship overall, as well as on how registered apprenticeship program design impacts retention, completion, exit wages, and learning. In particular, increased scholarly attention must be paid to the learning needs of frontline apprentices and their ability to access high-demand, family-sustaining, middle skills occupations. Many conceptual and non-scholarly papers in the practice literature make claims for the promise of RA, without rigorous educational research that provides a foundation for such claims. Targeted research into the role of community colleges in RTI is necessary to inform the rapid expansion of service industry RAPs that are utilizing these systems. More

research on unregistered apprenticeships would also add depth and new perspectives to elements that promote and detract from apprentice success across industries. Cross walking adult learning research from other scholarly domains can assist workforce learning and economic development researchers in identifying factors that support apprentices to enroll, persist in, and complete their RAP and enjoy increased mobility along a career pathway in the years after completion. In addition, it should be noted that much of the practice literature centers the needs of employers; we are in need of more research that focuses in on the design of RTI and OJT and how they can promote apprentice success over the course a career and a lifetime of learning.

References

Amoyaw, M., & Brown, D. (2018, June 11). *Apprenticeship America: An idea to reinvent postsecondary skills for the digital age.* Third Way. Retrieved January 5, 2022, from https://www.accs.edu/wp-content/uploads/2019/05/apprenticeship-america-an-idea-to-reinvent-postsecondary-skills-for-the-digital-age.pdf

Argyres, A., & Moir, S. (2008). Building trades apprentice training in Massachusetts: An analysis of union and non-union programs, 1997-2007 (Paper No. 2). Labor Resource Center Publications.

Ayres, S. (2014). Apprenticeships in the United States: Can they improve youth employment outcomes? In G. Randolph (Ed.). *Overcoming the youth employment crisis* (pp. 37-47). Just Jobs Network.

Becht, C. (2019). Apprenticing America: The effects of tax credits for registered apprenticeship programs. Master's Thesis, Georgetown University.

Beer, A. (2019). Apprenticeships: An emerging community college strategy for workforce development. Association of Community College Trustees.

Bergson-Shilcock, A. (2017). *Foundational skills in the service sector: Understanding and addressing the impact of limited math, reading, and technology proficiency on workers and employers.* National Skills Coalition.

Berik, G., & Bilginsoy, C. (2000). Do unions help or hinder women in training? Apprenticeship programs in the United States. *Industrial Relations: A Journal of Economy and Society, 39*(4), 600-624. doi: 10.1111/0019-8676.00185

Berik, G., & Bilginsoy, C. (2002). Unions and women's training for the skilled trades in the U.S. The *Review of Black Political Economy, 29*(4), 97-122. doi:10.1007/bf02717299

Berik, G., & Bilginsoy, C. (2006). Still a wedge in the door: Women training for the construction trades in the USA. *International Journal of Manpower, 27*(4), 321-341. doi:10.1108/01437720610679197

Bilginsoy, C. (2005). How unions affect minority representation in building trades apprenticeship programs. *Journal of Labor Research, 26*(3), 451-463. doi:10.1007/s12122-005-1014-4

Bilginsoy, C. (2007). Delivering skills: Apprenticeship program sponsorship and transition from training. *Industrial Relations, 46*(4), 738-765. doi:10.1111/j.1468-232X.2007.00495.x

Bilginsoy, C. (2018). Unemployment, the Great Recession, and apprenticeship attrition in the U.S. *Journal of Vocational Education & Training, 70*(2), 171-192. doi:10.1080/13636820.2017.1392999

Boi, K. J. (1993). *A nation of programs with no system: Apprenticeship in America*. The Industrial College of the Armed Forces. https://apps.dtic.mil/sti/pdfs/ADA278471.pdf

Bosch, G., & Charest, J. (2008). Vocational training and the labour market in liberal and coordinated economies. *Industrial Relations Journal, 39*(5), 428-447. doi:10.1111/j.1468-2338.2008.00497.x

Bower, L. M. (2007). *The experiences of five women in a skilled trade apprenticeship program.* [Doctoral dissertation, The University of Nebraska]. Proquest.

Bradley, D. H., & Herzenberg, S. A. (2002). *Construction apprenticeship and training in Pennsylvania*. Keystone Research Center. https://krc-pbpc.org/wp-content/uploads/krc_const_apprent.pdf

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101. doi: https://doi.org/10.1191/1478088706qp063oa

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*(1), 32-42.

Browning, B., & Sofer, N. (2017). *Making apprenticeship work for opportunity youth.* Jobs for the Future. http://jfforg-prod-new.s3.amazonaws.com/media/documents/OY_Apprenticeship_Case_Study_111417.pdf

Buera, F. J., & Kaboski, J. P. (2012). The rise of the service economy. *American Economic Review, 102(*6), 2540-2569. doi: 10.1257/aer.102.6.2540

Byrd, B. (1999). Women in carpentry apprenticeship: A case study. *Labor Studies Journal, 24*(3), 3-22. doi:10.1177/0160449X9902400301

Cai, J. (2018). *A new look at apprenticeship: Linking school to 21st century skills.* Center for Public Education. https://files.eric.ed.gov/fulltext/ED608812.pdf

Cantor, J. A. (1994). Apprenticeships and community colleges: Linkages in America's defense. *Journal of Industrial Teacher Education, 31*(3), 8.

Cantor, J. A. (1995). Apprenticeships link community-technical colleges and business and industry for workforce training. *Community College Journal of Research and Practice, 19*(47-71. doi: 10.1080/1066892950190105

Carcary, M. (2009). The research audit trial: Enhancing trustworthiness in qualitative inquiry. *Electronic Journal of Business Research Methods*, *7*(1), 11-24.

Chan, S. (2013). Learning Through Apprenticeship: Belonging to a Workplace, Becoming and Being. *Vocations and Learning, 6*(3), 367-383. doi:10.1007/s12186-013-9100-x

Cheney, G. R. (2017). *Apprenticeship in brief: A discussion paper*. Committee for Economic Development.

Colborn, J. (2015). *Recasting American apprenticeship*. The Aspen Institute.

Collins, A., Brown, J. S., Newman, S., & Resnick, L. (1989). Knowing, learning, and instruction: Essays in honor of Robert Glaser. *Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics*, 453-494.

Copeman Petig, A., Chávez, R., & Austin, L. J. (2019). *Strengthening the knowledge, skills, and professional identity of early educators: The impact of the California SEIU Early*

Educator Apprenticeship Program. Center for the Study of Child Care Employment. https://escholarship.org/content/qt49t8k2mr/qt49t8k2mr.pdf

Copson, Kappil, Gardiner, Clarkwest, & Engle. (2021). *Implementing registered apprenticeship programs: Experiences of 10 American apprenticeship initiative grantees.* U.S. Department of Labor, Employment and Training Administration.

Craig, R., & Bewick, T. (2018). *Making apprenticeships work: Five policy recommendations*. University Ventures.

Crewe, Y. M. (2020). *The impact of registered apprenticeships on the middle-skills gain Virginia* [Doctoral dissertation, Virginia Commonwealth University]. VCU Scholars Compass.

Cruess, S. R., & Cruess, R. L. (2018). The development of professional identity. *Understanding Medical Education: Evidence, Theory, and Practice*, 239.

de Alva, J. K., & Schneider, M. (2018). *Apprenticeships and community colleges: Do they have a future together?* American Enterprise Institute.

Decker, D. (2019). Student perceptions of higher education and apprenticeship alignment. *Education Sciences, 9*(2), 86. doi: 10.3390/educsci9020086

Devins, D., & Gold, J. (2014). Re-conceptualising talent management and development within the context of the low paid. *Human Resource Development International, 17*(5), 514-528. doi:10.1080/13678868.2014.954191

Dimeny, E. (2019). *Skilling up: The scope of modern apprenticeship*. Urban Institute. https://files.eric.ed.gov/fulltext/ED601793.pdf

Dixon-Woods, M., Cavers, D., Agarwal, S., Annandale, E., Arthur, A., Harvey, J., …Sutton, A.J. (2006). Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups. *BMC Medical Research Methodology, 6*(35). doi: 10.1186/1471-2288-6-35

Doty, A. V., & Odom, R. T. (1997). The apprenticeship revival: Examining community college practices. *New Directions for Community Colleges, 97*, 61-71. doi:10.1002/cc.9707

Dula, C. (2021). The 2021 net impact and cost-benefit evaluation of Washington State's workforce development programs. Washington Workforce Training and Education Coordinating Board.

Duemmler, K., & Caprani, I. (2017). Identity strategies in light of a low-prestige occupation: the case of retail apprentices. *Journal of Education and Work, 30*(4), 339-352.

Dummert, S. (2020). Employment prospects after completing vocational training in Germany from 2008-2014: A comprehensive analysis. *Journal of Vocational Education & Training*, *73*(3), 1-25. doi: 10.1080/13636820.2020.1715467

Eisenberg, S. (2018). We'll call you if we need you: Experiences of women working construction. Cornell University Press.

Fortwengel, J., Gospel, H., & Toner, P. (2021). Varieties of institutional renewal: the case of apprenticeship in the US, England, and Australia. *Journal of Vocational Education & Training*, *73*(1), 71-94. doi: 10.1080/13636820.2019.1688855

Fouarge, D., Schils, T., & de Grip, A. (2013). Why do low-educated workers invest less in further training? *Applied Economics, 45*(18), 2587-2601. doi:10.1080/00036846.2012.671926

Freire, P. (1970). *Pedagogy of the oppressed* (M.B. Ramos, Trans.). Continuum, 2007.

Fullagar, C., McCoy, D., & Shull, C. (1992). The socialization of union loyalty. *Journal of Organizational Behavior, 13*(1), 13-26. doi:10.1002/job.4030130103

Fuller, R. (2016). *An analysis of registered apprenticeship programs in the California community colleges*. Doctoral dissertation, California State University [Sacramento]. Proquest.

Gaudet, C., Annulis, H., & Kmiec, J. (2010). Measuring the impact of a pilot geospatial technology apprenticeship program for the Department of Labor. *Performance Improvement, 49*(10), 28-38. doi:10.1002/pfi.20183

Glover, R. W., & Bilginsoy, C. (2005). Registered apprenticeship training in the US construction industry. *Education & Training, 47*(4-5), 337-349. doi:10.1108/00400910510601913

Glover, R. W., Clopton, L., McCollum, M., Wang, X. (2007). Building an apprenticeship and training system for maintenance occupations in the American transit industry. *Education +Training*.

Gordon, H. R. D. (2003). Selected factors of teaching effectiveness: Perceptions of apprenticeship trainers. *Journal of Technology Studies, 29*(1), 56-59. doi:10.21061/jots.v29i1.a.9

Gospel, H. (1994). The survival of apprenticeship training: A British, American, Australian comparison. *British Journal of Industrial Relations, 32*(4), 505-522. doi:10.1111/j.1467-8543.1994.tb01048.x

Gunn, P., & De Silva, L. (2008). *Registered apprenticeship: Findings from site visits to five states.* U.S. Department of Labor, Employment and Training Administration.

Haddaway, N. R., Collins, A. M., Coughlin, D., & Kirk, S. (2015). The role of Google Scholar in evidence reviews and its applicability to grey literature searching. *PloS one*, *10*(9). doi: 10.1371/journal.pone.0138237

Hanks, A., McGrew, A., & Zessoules, D. (2018). *The apprenticeship wage and participation gap.* Center for American Progress.

Hanson, D., & Lerman, R. I. (2016). Military apprenticeships in the US: An implementation evaluation. *Education + Training, 58*(6), 597-612. doi:10.1108/ET-01-2016-0013

Hatcher, T. (1995). From apprentice to instructor: Work ethic in apprenticeship training. *Journal of Industrial Teacher Education, 33*(1).

Hecker, I., & Kuehn, D. (2019). *Apprenticeship and the justice system.* Urban Institute.

Hedayati Mehdiabadi, A., & Li, J. (2016). Understanding Talent Development and Implications for Human Resource Development. *Human Resource Development Review, 15*(3), 263-294. doi:10.1177/1534484316655667

Helmer, M., & Conway, M. (2014). *Workforce intermediaries and the apprenticeship system: Lessons and implications from the construction industry*. In M. Conway & R. P. Giloth (Eds.). Connecting people to work: Workforce intermediaries and sector strategies (pp. 325-347). Aspen Institute.

Helper, S., Noonan, R., Nicholson, J. R., & Langdon, D. (2016). *The benefits and costs of apprenticeships: A business perspective*. U.S. Department of Commerce.

Heyvaert, M., Hannes, K., & Onghena, P. (2016). *Using mixed methods research synthesis for literature reviews: The mixed methods research synthesis approach* (Vol. 4). Sage Publications. doi: https://doi.org/10.4135/9781506333243

Hollenbeck, K., & Huang, W. J. (2016). *Net impact and benefit-cost estimates of the workforce development system in Washington state*. Upjohn Institute for Employment Research. doi: 10.17848/tr06-020

Howze, P. B. (2015). *American apprenticeship as a transformative learning experience: A phenomenology*. Unpublished doctoral dissertation, North Carolina State University.

Huberman, M., & Miles, M. B. (2002). *The qualitative researcher's companion*. Sage.

Hunt, B. R. (2020). Apprenticeship participation at GE Appliances: An insider's ethnographic study of apprentice participation and factors contributing to student success (Publication No. 179). Doctoral dissertation, Western Kentucky University. Topscholar.

Institute for Corporate Productivity, Aspen Institute, & UpSkill America. (2016). *Developing America's frontline workers.*

Jacoby, D. (1991). The transformation of industrial apprenticeship in the United States. *The Journal of Economic History*, *51*(4), 887-910. doi: 10.1017/s0022050700040158

Jacoby, T., & Lerman, R. I. (2019). *Industry-drive apprenticeship: What works, what's needed*. Opportunity America.

Johnson, M. L., & Lambeth, J. M. (2017). Redefining instruction in apprenticeship training. *Plans & Trusts, 35*(1), 14-18.

Jopson, A. D., Skillman, S. M., & Frogner, B. K. (2019). *Use of apprenticeship to meet demand for medical assistants in the US.* Center for Health Workforce Studies, University of Washington.

Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education, 25*(1), 15-28.

Kalleberg, A. L. (2011). Good jobs, bad jobs: The rise of polarized and precarious employment systems in the United States, 1970s-2000s. Russell Sage Foundation.

Kalleberg, A. L., & von Wachter, T. M. (2017). The US labor market during and after the Great Recession: Continuities and transformations. *The Russell Sage Foundation Journal of the Social Sciences*, *3*(3), 1-19.

Kaskutas, V., Dale, A. M., Lipscomb, H., Gaal, J., Fuchs, M., & Evanoff, B. (2010). Changes in fall prevention training for apprentice carpenters based on a comprehensive needs assessment. *Journal of Safety Research, 41*(3), 221-227. doi:10.1016/j.jsr.2010.01.006

Kearney, M.S., Hershebein, B., & Jacome, E. (2015). *Profiles of change: Employment, earnings, and occupations from 1990-2013*. The Hamilton Project, Brookings Institution. https://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/Employment_Earnings_Occupations_Changes_1990-2013_FINAL_1.pdf

Kitchenham, B. (2004). *Procedures for performing systematic reviews.* Keele University, Department of Computer Science. http://www.elizabete.com.br/rs/Tutorial_IHC_2012_files/Conceitos_RevisaoSistematica_kitchenham_2004.pdf

Koller, V. (2018). *Closing the gap: The future of apprenticeship in California*. Jobs for the Future.

Kuehn, D. (2019). Registered apprenticeship and career advancement for low-wage service workers. *Economic Development Quarterly, 33*(2), 134-150. doi:10.1177/0891242419838605

Kuehn, D., Hecker, I., & Simon, A. (2019). *Registered apprenticeship in science and engineering.* Urban Institute. https://files.eric.ed.gov/fulltext/ED595859.pdf

Kuehn, D., & Jones, D. A. (2018). *Sub-baccalaureate STEM education and apprenticeship*. Urban Institute.

Kyndt, E., Govaerts, N., Dochy, F., & Baert, H. (2011). The learning intention of low-qualified employees: A key for participation in lifelong learning and continuous training. *Vocations and Learning, 4*(3), 211.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Lazaryan, N., Neelakantan, U., & Price, D. A. (2014). *The prevalence of apprenticeships in Germany and the United States* (Report No. 14-08). Federal Research Bank of Richmond.

Lerman, R. I. (2016a). Reinvigorate apprenticeships in America to expand good jobs and reduce inequality. *Challenge*, *59*(5), 372-389.

Lerman, R. I. (2016b). Can we develop enough skills for a robust manufacturing industry? *Challenge, 59*(3), 157-177. doi: http://dx.doi.org/10.1080/05775132.2016.1178557

Lerman, R. I., Eyster, L., & Kuehn, D. (2014). Can we upgrade low-skill, low-wage occupations? The case of apprenticeships in the long-term care occupations. *Journal of Women, Politics & Policy, 35*(2), 110-132.

Lerman, R., Hanson, D., Dobson, C., Tanamor, M., & Blatt, L. (2015). *The United Services Military Apprenticeship Program (USMAP): Implementation study and feasibility of an impact study*. Urban Institute.

Lerman, R. I., Loprest, P., & Kuehn, D. (2020). *Training for jobs of the future: Improving access, certifying skills, and expanding apprenticeship* (IZA Policy Paper No. 166). Institute of Labor Economics. https://www.econstor.eu/bitstream/10419/243452/1/pp166.pdf

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.

Lloyd, C., & Mayhew, K. (2010). Skill: the solution to low wage work? *Industrial Relations Journal, 41*(5), 429-445.

Love, I., & McCarthy, M. A. (2018). *Apprenticeship and the future of nursing: An equity-based strategy to address the bachelor's degree gap.* New America. https://www.newamerica.org/education-policy/reports/apprenticeship-and-future-nursing/

Manzo, J., Manzo IV, F., & Bruno, M. R. (2019). *The impact of construction apprenticeship programs in Minnesota: A return-on-investment analysis.* Midwest Economic Policy

Institute. https://midwestepi.files.wordpress.com/2019/09/mepi-uiuc-impact-of-apprenticeships-programs-in-minnesota-final.pdf

Mauldin, B. (2011). *Apprenticeships in the healthcare industry.* Administration for Children and Families, U.S. Department of Health & Human Services.

McCarthy, M. A., Palmer, I., & Prebil, M. (2017). *Connecting apprenticeship and higher education: Eight recommendations*. New America.

McGrew, A., & Hanks, A. 2017. *The case for paid apprenticeships behind bars.* Center for American Progress.

Messing-Mathie, A. (2015). Building apprenticeship systems for middle-skill employment: Comparative lessons in innovation and sector-based strategies for apprenticeships. National Academies Board on Science, Technology, and Economic Policy.

Mollica, J. (2020). Opening doors to apprenticeship for English language learners. *COABE Journal, 9*(1), 13-24.

National Center for Education Statistics. (2021). *Back-to-school statistics*. Retrieved February 8, 2023 from https://nces.ed.gov/fastfacts/display.asp?id=372#Postsecondary-enrollment

National Skills Coalition. (2020). *Lack of access to skills training hurts workers and businesses*. https://www.nationalskillscoalition.org/wp-content/uploads/2020/12/US-Skills-Mismatch-Fact-Sheet-2020.pdf

Nehls, H. (2019). *Strengthening international exchange and cooperation with labor unions in America in the field of apprenticeship/vocational training.* Federal Ministry of Education and Research, Germany.

Nichols, H. M., Swanberg, J. E., & Bright, C. L. (2016). How does supervisor support influence turnover intent among frontline hospital workers? The mediating role of affective commitment. *The Health Care Manager, 35*(3), 266-279.

Okoli, C. (2015). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, *37*(1), 43.

Olinsky, B., & Ayres, S. (2013). *Training for success: A policy to expand apprenticeships in the United States.* Center for American Progress.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906.

Payne, J. R. (2016). *A pilot benefit and cost analysis study of sponsors of registered apprenticeship in Maine* (Publication No. 10249315) [Doctoral dissertation, University of Southern Maine]. Proquest.

Penn, R. (1998). Social exclusion and modern apprenticeships: A comparison of Britain and the USA. *Journal of Vocational Education & Training*, *50*(2), 259-276.

Porter, R. D., Vroonland, J. E., & Buckingham, R. S. (1997). Predictors of students' success in the medical service apprentice course. *Military Medicine, 162*(7), 495-500.

Prebil, M. (2019). Solid foundations: Four state policy approaches for supporting college-connected apprenticeships. New America.

Public Sector Consultants, Inc. (2017). *Benefits of Michigan apprenticeship programs*. Author.

Reed, D., Liu, A. Y. H., Kleinman, R., Mastri, A., Reed, D., Sattar, S., & Ziegler, J. (2012). *An effectiveness assessment and cost-benefit analysis of registered apprenticeship in 10 states.* Mathematica Policy Research.

Riccucci, N. M. (1991). Apprenticeship training in the public sector: Its use and operation for meeting skilled craft needs. *Public Personnel Management, 20*(2), 181. doi:10.1177/009102609102000206

Ross, M. & Holmes, N. (2017). Meet the out-of-work: Local profiles of jobless adults and strategies to connect them to employment. Brookings Institution.

Rossmeier, V. (2015). *Apprenticeships: In New Orleans & Louisiana* (Issue brief No. 5). Cowen Institute. https://files.eric.ed.gov/fulltext/ED586966.pdf

Sattar, S., Kauff, J., Kuehn, D., Munoz, V. S., Reiter, A., & Wolff, K. (2021). *State experiences expanding registered apprenticeship: Findings from a federal grant program* (No. 3a81b7aca09f427aafdb83b6bd7e9d7e). Mathematica Policy Research.

Saylor, W. G., & Gaes, G. G. (1997). Training inmates through industrial work participation and vocational and apprenticeship instruction. *Corrections Management Quarterly*, *1*(2), 32-43.

Sharp, N., & Dvorkin, E. (2018). *The promise of apprenticeships in New York*. Center for an Urban Future. https://files.eric.ed.gov/fulltext/ED592760.pdf

Shaw, S., Gordon, H. R., Xing, X., & Carroll, M. C. (2019). Why apprenticeship programs matter to 21st century postsecondary education. *CTE Journal*, *7*(2), 1-10.

Snell, A., Voss, J., & Kline, J. (2017). *Attitudes towards apprenticeship programs.* Lake Research Partners.

Swegle, R. W. (2017). Characteristics of United Brotherhood of Carpenters and Joiners of America apprentice graduates of completing the apprenticeship program in Illinois. Unpublished doctoral dissertation, University of Wisconsin-Stout.

Tett, L. (2016). Learning, literacy and identity: 'I don't think I'm a failure anymore'. *British Journal of Sociology of Education, 37*(3), 427-444.

Toom, A., Pyhältö, K., Pietarinen, J., & Soini, T. (2021). Professional agency for learning as a key for developing teachers' competencies? *Education Sciences, 11*, 324. doi:10.3390/educsci11070324

U.S. Department of Labor. (2021). *FY 2021 Data and statistics.* Author.

U.S. Department of Labor. (2023). Explore registered apprenticeship. Author. Retrieved at: Homepage | Apprenticeship.gov

Uttley, C., & Horm, D. (2008). Mentoring in Early Childhood Professional Development: Evaluation of the Rhode Island Child Development Specialist Apprenticeship Program. *Journal of Early Childhood Teacher Education, 29*(3), 237-252. doi:10.1080/10901020802275286

Uwakweh, B. O. (2006). Motivational climate of construction apprentice. *Journal of Construction Engineering & Management, 132*(5), 525-532. doi:10.1061/(ASCE)0733-9364(2006)132:5(525)

Welton, A. D., & Owens, D. R. (2017). *Scaling up registered apprenticeships at Illinois community colleges*. University of Illinois at Urbana-Champaign, The Office of Community College Research and Leadership.

Windisch, H. C. (2016). How to motivate adults with low literacy and numeracy skills to engage and persist in learning: A literature review of policy interventions. *International Review of Education, 62*(3), 279-297. doi:10.1007/s11159-016-9553-x

Workman, E. (2019). Earning while learning with early educator apprenticeship programs. New America.

Chapter 3

Gallup, A. & Svihla, V. (2024). Promoting success among frontline healthcare apprentices [Manuscript submitted for publication].

Promoting success among frontline healthcare apprentices

Abstract

Registered apprenticeship (RA) programs in frontline healthcare occupations are a new frontier in workforce development and design for adult learning. This multiple case study explored how frontline healthcare apprentices develop professional identity, self-efficacy, and the intent to persist in their RA programs (RAPs) and professions. We analyzed interviews (n=17) with frontline healthcare apprentices (n=12) and RAP leaders (n=5). The resulting 3 composite cases illustrate a developmental trajectory of professional identity and self-efficacy in an understudied context and shed light on how traditional and innovative aspects of RAP designs contribute to apprentices' persistence intentions in notoriously challenging frontline healthcare occupations.

Introduction and Research Purpose

The COVID-19 pandemic raised public awareness of a related crisis: the U.S. has a shortage of healthcare workers (Bateman et al., 2021; Haddad et al., 2022). Demand for healthcare workers in the U.S. is increasing faster than for any other occupation (U.S. Bureau of Labor Statistics, 2022), with some groups of frontline healthcare workers (FHCWs), such as medical assistants, homecare providers, and community health workers (Bateman et al., 2022; U.S. Bureau of Labor Statistics, 2022) in particularly high demand. FHCWs are the backbone of the healthcare system, giving medications and immunizations, screening patients for conditions, coordinating care, measuring vital signs, deescalating conflicts, comforting and assisting the sick and dying, and much more (Frontline Health Workers, 2022). To meet

this pressing demand, labor unions, employers, and training providers are increasingly using the registered apprenticeship (RA) model to build pipelines of skilled providers. The number of active, registered apprentices in healthcare increased each year between 2016 and 2020 and then doubled in one year, from 6,862 in 2020 to 12,782 in 2021 (U.S. Department of Labor, 2022).

RA programs (RAPs) blend contextualized instruction (related technical instruction, or RTI) with practical on-the-job training (OJT) under the guidance of an experienced mentor. While research in many industries has demonstrated the value of RA (Helper et al., 2016; Reed et al., 2012), frontline healthcare occupations present unique challenges to the use of the model. These positions typically offer relatively low wages and low occupational prestige (Dill et al., 2016; Nichols, et al, 2016; Tomer & Kane, 2020; U.S. Bureau of Labor Statistics, 2022). They can be stressful due to fast-paced, high-stakes work with the public, resulting in high turnover (Froessl & Abdeen, 2021; Norman et al., 2021). Many FHCWs must pass certification exams before they can do the work they are training for, complicating traditionally concurrent RTI and OJT. Mentoring, too, can be a challenge in the fast-paced frontline context. While trades RAPs offer regular wage increases over approximately four years and the promise of a high income after completion, much shorter frontline healthcare RAPs are often unable to make the same promises; hourly wages may differ only slightly for a new apprentice and an apprenticeship completer.

Characteristics of the frontline healthcare worker-learner population depart in some ways from those of traditional trades apprentices. While trades RAPs are dominated by white men (Berik & Bilginsoy, 2006) and have a history of discrimination against women and other minoritized groups (Berik & Bilginsoy, 2002), FHCWs are diverse and most likely to be women (Tomer & Kane, 2020). Frontline healthcare apprentices and traditional trades apprentices also share some characteristics, such as limited literacy, numeracy, and/or digital problem-solving skills (Bergson-Shilcock, 2017). As a result, they may be less likely to take advantage of workplace learning opportunities and persist within them (Organization for

Economic Cooperation and Development, 2019), in part due to stigma and negative learning identities born out of past educational experiences (Illeris, 2006; Windisch, 2016). For frontline healthcare apprentices, participation and persistence are impacted by other barriers, such as lack of access to childcare and transportation, and career-related trauma in and after the pandemic era (Coker, 2023).

Even in trades RAPs, completion rates tend to be low—often under 50%, and even lower for women and other marginalized groups (Reed et al., 2012). Compounded with high turnover among FHCW, there is a need for research on ways RAPs can be designed to promote persistence. This study investigates the development of professional identity and self-efficacy among frontline healthcare apprentices, a population that is rarely studied, especially in comparison to university-based nursing students, and the role these characteristics have in bolstering apprentice persistence. Specifically, we first aimed to characterize frontline apprentices' trajectory through the RAP and identify the factors that contributed to the development of these characteristics at each point and supported apprentices' intent to complete the RAP and persist in frontline healthcare work. Second, from this, we sought to identify structural elements of RAPs that contributed to apprentices' success. To address the research aims, we used a multiple case study research design.

Framework

Learning in apprenticeship is a process of identity development

Apprenticeship is a model for workplace learning in which apprentices are supported to build knowledge and skills in context, eventually becoming experts in their field (Lave & Wenger, 1991). The development of expertise has been characterized by researchers and theorists as a continuum or trajectory, progressing over time through identifiable stages (e.g., novice, advanced beginner, competent, proficient, and expert) marked by increasing proficiency in complex problem-solving (Chi et al., 1988; Dreyfus & Dreyfus, 2005). The experts who emerge from this process not only know more, they also organize and integrate

information in more efficient ways, retrieve information more quickly and with less effort, and rely more on intuition and their deep understanding of the field, rather than upon the rules and principles that guide novices (Persky & Robinson, 2017). However, learning is not simply a progression through these stages of expertise. Through learning, individuals transform; they view themselves differently and are viewed differently by others. Social theories of learning hold that learning and identity development are closely intertwined. Wortham (2004) used the case of a young student's year of participation in a history and English classroom to illustrate how learners simultaneously engage with curriculum and transform their social identity. As they learn, people are able to participate in new activities and "shift their positions with respect to other people" (p. 30), changing "not just what the learner knows, but also who the learner is" (p. 3). Wenger's (1998) communities of practice (CoP) theory emphasizes that learning occurs primarily through social interaction. Novice apprentices join a community of practice, a group of practitioners with similar interests, challenges, and goals. Through participation in that community—with other apprentices, co-workers, mentors, and supervisors—they gradually construct an identity as a practitioner. Lave and Wenger (1991) describe the process of legitimate peripheral participation, in which a novice moves from the edges, or periphery, of a community of practitioners, into its sphere, then progressively toward full, mature participation in its center. Active engagement and interaction drive this movement and are necessarily situated in the authentic context; that is, experiences are meaningful because they take place within and are relevant to the real, daily activities of the community members. All these authors use apprenticeship itself as an example of how knowledge and identity necessarily develop simultaneously as the apprentice becomes an expert. Fundamental to these social theories of learning is the notion of a trajectory and the process of becoming—from novice to expert, from the sidelines to full participation in the community. As this slow, interactive process plays out within and throughout parts of a person's life, multiple identities continually take shape. Holland et al. (1998) also conceptualize identities as multiple and constructed through "the imaginings of self in worlds of action" (p. 5).

Professional identity development supports worker persistence

Among the multiple identities that an individual might construct is that of a professional. Professional identity is a worker's representation of self, developed over time, which includes the internalized values and norms of an occupation. This process of internalization leads the worker to think, act, and feel like a professional in that field over time (Cruess et al., 2014; Jarvis-Selinger et al., 2012).

Empirical evidence shows that positive professional identity development is related to increased job satisfaction (Cortini, 2016) and an intent to persist in a career (Cruess & Cruess, 2018). In a longitudinal case study of baking apprentices in New Zealand, Chan (2013) links professional identity formation to learning and an intent to persist in the occupation. Through 4-5 years of apprenticeship, bakers are transformed by their engagement with the work and their mentors, until they emerge as independent craft bakers. One finding of their study is that other people attribute skills and identify them as bakers before the apprentices themselves have internalized this identity. Ibarra and Barbulescu (2010) describe how the process of creating a positive self-narrative about work can lead to a professional identity that is resilient even as professional roles transition over time, particularly when career choices deviate from what is traditionally valued.

Frontline healthcare RAPs differ in consequential ways

Much research speaks to importance of professional identity development in healthcare, evidenced by numerous studies of interventions in medical schools and university-based nursing programs that promote it (Kay et al., 2019; Li et al., 2021; Wyatt et al., 2021). Professional identity development among nurses has been linked to high-quality care (Andrews et al., 2011) and improved performance (Anderson et al., 2020). Positive role modeling from mentors has been found to promote professional identity development among nurses (Blouin, 2018; Mei et al., 2020), physicians (Cruess & Cruess, 2018), and occupational therapists (Davis, 2006).

However, the university-based nursing schools and higher-prestige medical contexts in which most research has been done differ substantially from the frontline healthcare RAPs that are the context of this study. Even in nursing, there is a historical and ongoing focus on professionalism, as nursing schools, national associations, and others promote more prestigious baccalaureate nursing degrees—where students must be able to cover tuition and devote significant amounts of time to study—as a standard for high-quality patient care (Love & McCarthy, 2018); apprenticeships are not held in such esteem and are sometimes considered to "deride the professionalism of nursing" (Barton, 2019, para. 6). Considering these programs and the structural, cultural, and disciplinarily power dynamics that shape who participates in them (Collins & Bilge, 2020), it is not surprising that the majority of nurses in baccalaureate degree programs are white women, with some ethnic and racial minority groups, particularly Latinx, underrepresented among nurses (Smiley, et al., 2021). As such, students in nursing and medical degree programs generally differ from frontline healthcare apprentices in socioeconomic status, as well as in terms of age and time available for education. About 77% of baccalaureate degree-seeking nurses are below the age of 25 (Ball, 2021), while the average age of a new apprentice in the U.S. is 29 (Amoyaw & Brown, 2018). As such, apprentices are more likely to be caring for a family while they are in their RAP. This likelihood, coupled with simultaneous full-time or nearly full-time employment during an apprenticeship, potentially leaves an apprentice with less time free for education. These differences could be consequential for frontline healthcare RAPs in terms of the barriers apprentices face, producing different trajectories for the development of professional identity, self-efficacy, and persistence in careers, especially given findings that constructing a sense of belonging at work is influenced not only by gender expectations and representation in a profession (Hatmaker, 2013), but also by social class (Giazitzoglu & Muzio, 2021) and race and ethnicity (Frost & Regehr, 2013). Further, medical and nursing schools offer longer learning experiences, with bachelor's degrees in nursing usually taking four years, while a licensed professional nurse (LPN) RAP might take only 1-2 years, because the apprenticeship builds upon the existing knowledge and experience of the healthcare worker.

The shorter average duration of frontline healthcare RAPs may have implications for professional identity development, which is a process that unfolds slowly over time.

Self-efficacy is associated with success and contributes to professional identity

Another characteristic that contributes to a learner's success is self-efficacy, an individual's beliefs about their ability to achieve a particular outcome (Bandura, 1997). Sometimes termed confidence, these beliefs can impact a person's competence and performance in a given area. Bandura (1997) maintained that we derive self-efficacy from four sources: learning experiences in which we powerfully experience success; vicarious experiences, which includes observing others as role models; verbal persuasion, which occurs when influential others encourage us; and our emotional or physical states, which can influence the way we feel about our abilities. Self-efficacy has been associated with success in a wide range of educational contexts. In healthcare education, self-efficacy is positively associated with lower test anxiety (Warshawski et al., 2019), higher levels of resilience (Hughes et al., 2021), and persistence (Wang et al., 2017). Conversely, low self-efficacy is associated with job burnout (Yao et al., 2018). During the COVID-19 pandemic, frontline healthcare workers with lower self-efficacy in dealing with the outbreak were more vulnerable to anxiety, stress, and depression (Du et al., 2020).

The development of self-efficacy and professional identity are interrelated, with self-efficacy contributing over time to the development of a professional identity (Klotz et al., 2014). Numerous studies of doctors and nurses positively link self-efficacy with professional identity development (Eren & Turkmen, 2020; Mei et al., 2022; Shen et al., 2020). In alignment with Bandura's tenets that observing successful role models, particularly those who are similar to ourselves, and encouragement from role models promote the development of self-efficacy, findings that emphasize the importance of mentorship are common in this literature as well. For example, Byram et al. (2022) found interaction with and observation of

mentors built self-efficacy and promoted professional identity by offering learners the chance to imagine themselves as successful clinician educators.

Identity and self-efficacy predict intent to persist

In various educational contexts, professional identity and self-efficacy have been found to predict intent to persist. For instance, self-efficacy and identity in the discipline contribute to persistence among STEM undergraduates (Hsu et al., 2021). A qualitative study of professional identity formation among pre-service teachers showed how an emerging professional identity and self-efficacy beliefs, shaped by personal and academic experiences, impacted students' desire to persist in the profession (Kaynak, 2019). Chan (2013) linked professional identity development to intent to persist in baking apprentices. In healthcare education, too, studies have shown how growth in self-efficacy and professional identity can promote an intent to persist in a career pathway. Byram et al. (2022) found that physicians who aspired to be clinician-educators (CEs) built self-efficacy through skill development and observation of mentor CEs who embodied their career aspirations. This development of self-efficacy contributed over time to the formation of a professional CE identity, reinforcing their career goals to become CEs and making them likely to take concrete steps toward achieving those goals. Hu et al. (2022) used the Nursing Career Identity Scale (NCIS), which includes a self-efficacy dimension, to measure nurses' sense of professional identity. They found a positive relationship between professional identity and job satisfaction and further concluded that these characteristics are associated with fewer intentions to leave the profession.

While the reviewed literature contributes to understanding of how novices develop professional identity, self-efficacy, and intent to persist in their occupations, most studies have focused on the experiences of university students and workers in more prestigious occupations, such as medical residents and registered nursing students. There exists a gap in research on the needs and experiences of the frontline worker population itself, and certainly

among registered apprentices. Given the differences in educational background and life experiences between this population and university students, medical students, and workers in higher-prestige occupations, coupled with the demand for frontline occupations, it is important to understand the development of characteristics that promote success and persistence in the FHCW population. This understanding could crucially inform scholars and practitioners regarding the design and development of new frontline healthcare RAPs as well as RAPs that serve the essential worker population, including the traditional building trades programs and newer RAPs in retail and hospitality.

Methodology

We selected multiple case study methodology for its capacity to provide a deep understanding of the issue under investigation (Stake, 2006). The complex, bounded systems analyzed in our multiple case study were three composite cases constructed from the interviews that elucidate key points along trajectory of development of professional identity, self-efficacy, and intent to persist.

Positionality

We approach adult learning in RA from social constructivist and interpretivist paradigms. As researchers, we view learning as social and participatory (Lave & Wenger, 1999). We believe the meaning of any event is co-constructed by the participants through interaction and that there are multiple realities (Bransford et al., 2000; Creswell & Plano Clark, 2017). The first author (she/her) is a white woman who worked for nearly two decades as a teacher and instructional designer in registered apprenticeship and pre-apprenticeship programs sponsored by labor-management partnerships in the building trades and healthcare. Her experiences within these programs, as well as her years as a labor activist, brought about her interest in frontline apprentices' learning and empathy for the barriers they face; this orientation toward the needs of the worker would likely have been evident in the interviews. The first author's professional contacts facilitated access to study participants. The second

author (she/they) is a tenured professor whose research and teaching focus on learning, identity, agency, and design across a range of settings. As a person with an invisible disability, their own experiences of health care likely shaped their interpretations.

Participants and Settings

We recruited current or former frontline healthcare occupation apprentices (current n = 7; completed within two years n = 5), as well as apprenticeship staff working in the leadership, design, or implementation of frontline healthcare RAPs (n = 5). The sample was purposive (Barglowski, 2018; Campbell et al., 2020), emphasizing selection of a range of different programs and frontline occupations. Participating apprentices were from 6 different RAPs, all of which were located on East or West coast regions of the U.S., where the great majority of frontline healthcare RAPs are currently situated. Five of the RAPs had labor union involvement. RAPs included a variety of frontline healthcare occupations: certified nursing assistant (CNA), medical assistant (MA), licensed professional nurse (LPN), central sterile processing tech, interventional radiologist, and registered nurse (RN). The RAP staff included labor union staff, employer partners, and leaders of training partner organizations. The majority of participants were women, reflecting the demographic makeup of frontline healthcare professions; only 2 apprentices and 2 RAP leaders were men. Participants were from various racial/ethnic groups. Among RAP leaders, 4 identified as white and one as Black. Among current and former apprentices, 6 identified as Latinx, 3 as Black, 2 as white and 1 as Asian. All former apprentices who participated in the study had successfully completed their RAP. We attempted to recruit former apprentices who left their programs prior to completion in order to gain more nuanced insight into apprentice experiences. However, these attempts were unsuccessful, as some lacked reliable contact information and others did not respond to our repeated attempts to contact them. RAP directors indicated that some former apprentices left their RAPs for personal reasons, such as health concerns, that had nothing to do with their experiences within the RAP, so it was not likely that interviews with them would yield insights on our research aims.

RAPs advertised their programs in similar ways. All apprentices in the study were incumbent workers at the time they began their RAP. While some noticed recruitment flyers in employment or union offices, most were recruited directly by union staff, who offered them the opportunity to apply for apprenticeship in a higher-prestige healthcare occupation, a step up on the career ladder. For example, a licensed vocational nurse (LVN) was personally recruited by his union to an RN RAP.

Data Collection and Analysis

We chose interviews in order to learn about the unique experiences and stories of each participant (Stake, 1995). The first author conducted 17 semi-structured interviews via Zoom between July and December of 2022. The interviews were designed to explore participants' perceptions of the apprenticeship experience. Interview questions for current and former apprentices explored the constructs of professional identity, self-efficacy, and intent to persist in educational and career goals; questions also sought information about the learning supports apprentices relied upon and the barriers they faced. Interviews with RAP leaders investigated the aforementioned constructs as well from their perspectives and also elicited detailed information about the design of the programs and the reasons behind the designs. We video-recorded interviews, assigned each interviewee a pseudonym, and produced initial transcripts using the automatic transcription software Descript, which we corrected. The first author also took field notes during and after interviews, which focused on observations about the interview as well as connections to ideas presented in other interviews and to the research constructs.

Data collection progressed iteratively with data analysis. The first author kept a journal to record analytic memos during each stage of analysis. We began open, inductive coding that generated a large number of in vivo and descriptive codes (Saldaña, 2014). For instance, we identified the in vivo codes "have the heart for it" and "I had my doubts," as well as the descriptive codes persisting, learning difference, and patience. We stopped

collecting interviews when we reached saturation of the initial codes (Boddy, 2016; Corbin & Strauss, 1990). In the second coding phase, we identified themes that addressed our research aims, combined codes into thematic categories, and coded the transcripts again using these themes, guided by Glaser and Strauss' (1967) constant comparative method of data analysis (Table 1).

Table 1. Examples of second phase codes

Themes	Codes	Example transcript
Caring. Participants describe themselves as caregivers, possessing qualities that suit to work with patients	"I have the heart"	"And I felt like I have the heart to be a CNA."
	Patience	"Um, it takes patience to work as a CNA."
	Caring is an innate trait	"it does explain me as a person that I am a caring and loving person towards people."
Doubt. Participants express doubt in their abilities or a lack of confidence in their role as an apprentice or as a healthcare provider.	Lack of confidence	"Um, well, I can't say I was confident."
	"I did have my doubts"	"Um, I felt like I probably wasn't gonna be the best CNA. So I did have my doubts."

In the third phase, we returned to theory to refine our understanding of the themes and their relevance to our research aims. For example, we coded the themes caring and doubt (Table 1), as respectively relevant to the constructs of professional identity and self-efficacy. After the third phase had begun, we collected more interviews from current apprentices to deepen our understanding of each case and check our analysis against new data (Miles & Huberman, 1994). In doing so, we did not find any contradictory information. A fourth round of coding focused specifically on structural elements of the RAPs that contributed to apprentices' participation and persistence. They included mentoring, wraparound supports, and flexibility for the learner (e.g., tutoring, assistance with costs like transportation; allowing multiple chances to test) and the recruitment of incumbent workers.

We took an instrumental approach—meaning we sought to use case study to understand an issue—to case selection in order to capture the complexity of participants' experiences and interpretations and to gain insight on self-efficacy and identity development in RA (Stake, 1995). Ragin and Becker (1992) and Barglowski (2018) advocate for an approach to case selection that remains open to change throughout the course of the research. Rather than conventionally-defined cases that are bounded necessarily by time and place, these authors argue that cases may be more strategically selected and bounded to elucidate analytical insights and theoretical constructs, increasing the transferability of findings. Through our analysis of the themes, we developed three composite cases as a way to present our findings. Each composite case condenses data from several interviews to present a single narrative. In this way, the richness and complexity of individuals' stories may be conveyed while transferability is enhanced and anonymity is preserved (Willis, 2019). After describing each case, we analyzed across cases to convey a trajectory of frontline healthcare apprenticeship (Creswell & Poth, 2016; Stake, 2006).

Trustworthiness

The use of a multiple case study design and composite cases to present findings contributes to both the credibility and transferability of our analysis, as several cases (derived from a larger number of interviews) increase richness and variation, reader engagement, and the chances that others will find their own context reflected therein (Merriam & Tisdell, 2015). Composite narratives also protect participants' identities (Hyett et al., 2014). To increase the trustworthiness of our interpretations through triangulation both within and across our cases, we used hour-long, in-depth interviews; member checking interviews; rich descriptions that allow readers to make their own decisions about the transferability of findings to their contexts; discussed the perspectives among ourselves and several peers and experts (including directors of apprenticeship programs); and employed multiple theories of learning as a conceptual framework (Denzin, 1978; McElhinney & Kennedy, 2022; Stake, 2006). The first author's research log established an audit trail that further contributed to credibility (Lincoln & Guba, 1985).

Results and Discussion

Our analysis resulted in three composite cases, arrayed in a trajectory, which we present below. The cases center workers' perceptions of their own apprenticeship experiences and exemplify three salient points along a trajectory of professional identity and self-efficacy development and provide insight into the evolution of an intent to persist in the apprentices' chosen frontline healthcare occupations. Before delving into the composite cases that portray this developmental trajectory, we depict a final point on the trajectory: the confident and compassionate frontline healthcare worker.

Confident and compassionate frontline healthcare workers

Three apprentices (Gary, April, Enrique) told stories that demonstrated high levels of self-efficacy and compassion in potentially high-stress work environments, intertwined with a conviction that healthcare is their permanent calling and a professional identity that is resilient despite challenges.

Gary

Gary Reed, who at the time of the interview had recently completed his RAP and become certified as an RN, had worked as a licensed vocational nurse (LVN) in a prison setting for many years, where he witnessed inmates go without timely medical care, sometimes with catastrophic results. Gary cited his personal commitment to easing suffering and affirming the humanity of all people when explaining his choice of a registered nurse (RN) apprenticeship program.

> I work at a prison where, you know, some people may think they don't deserve it. […] I said, look, when you, when you held your hand up as an LVN or an RN and you took the oath […] nowhere in there does it say exclude felons. […] Does it say exclude child rapists or, or child molesters or gang members or whatever? They are human beings. They breathe. […] They're just behind a fence line every night […] So me, I feel like, they, they, they have a headache, they can't go to a CVS and get a Tylenol. […] So I feel like I, I, as a person and now as a nurse, I offer you that care to the best of my ability.

In this quote, Gary positioned himself ("now as a nurse") and displayed self-efficacy in relating the scope of his field as including felons. In describing why he chose to train for an advanced career in his fifties, Gary reasoned that as an RN, he would have increased autonomy and the ability to make complex care decisions. He described a situation in which he was able to use his increased authority to save an inmate gasping for breath after having been denied an inhaler for too long, something he could not have done as an LVN:

> I told the officer, I said, "Push your button. We got a code. I need help. I need oxygen. I need my, my team here." Boom, push the code, get oxygen on the guy, took him to the emergency room. We took care of it, you know? And so, I feel like because of my, my nurturing, caring attitude, I feel that's what's gonna benefit me in the, as an, as a, a registered nurse because now I have more control.

In this quote, Gary displayed a high level of self-efficacy in his role and affirmed his position and identity interactionally by assertively instructing an officer. His discourse—"my team" and "we took care"—positions him as a professional who is responsible in the

situation. Gary also described microaggressions and resisting others' positioning of him based on his appearance.

> 'Cause I've always been this big, burly, cop-looking guy, you know, to be a softhearted nurse, and to be able to, you know, take a, a 95-year-old lady that weighs 75 pounds and swoop her up and take her to the bathroom and put this big smile on her face and her family. You can't look at me and say, "Hey, you're a registered nurse? […] You should be a, a detective or a highway patrol, you're so mean and intimidating." […] And I, so I just feel like [nursing] is, that is my, my, uh, my calling. […]

Here, Gary's comments display a resilient professional identity, despite frequent misidentification as a warden or prison guard. Far from leading him to question his choice of profession, Gary connected these personal characteristics to being able to do his job well. Given this, it is unsurprising that Gary expressed intentions to continue as a nurse for the rest of his career, recognizing that his status as an RN will enable him to be more selective about the jobs he takes, as well as to plan for his retirement.

> I could probably do the job 'til I'm 80. To be able to retire when I'm 70, to be able to retire with my wife. […] This profession can provide the ultimate goals for whatever you want to do, you know? And, and that's the, the rewarding part of being, getting to the RN [level].

April

At the time of the interview, April Walker was in her early sixties and had been in frontline healthcare much of her life, as a phlebotomist and in other roles. As a new medical assistant (MA) apprentice, she drew on her experiences as two-time cancer survivor when providing compassionate care, explaining, "I know what it's like to be treated badly." April's description of a harrowing experience at the clinic where she worked revealed her high self-efficacy in her role, intertwined with her framing of her role as protective. A teenager visited the clinic and requested an invasive procedure for the purposes of birth control. She explained that the attending doctor's efforts to carry out the procedure went awry, causing

physical and emotional trauma for the patient. Though only an apprentice under supervision by a licensed MA, April took control of the situation to protect the teenager:

> She's bleeding and crying…and I'm trying to, oh God, keep her breathing and help her breathe. And I'm, you know, rubbing her hair and, yeah, and I'm thinking, my [mentor] is behind me doing nothing, saying nothing! […] And I finally just, I just looked [the doctor] right in the eye and I said "Stop, please." And he just looked at me and I thought, oh, I'm gonna lose my job. And I said, "Please stop. I want to talk to the patient."

The procedure was ultimately halted at the patient's request. When asked how she felt about taking control of the situation in her position as an apprentice, she explained, "I felt really comfortable about it. And I don't believe [my mentor] would ever step in or speak out. I'm wondering how long he [the doctor] would have continued." In this way, April's comments, like Gary's, reveal a framing of professional identity that is resilient and even oppositional at moments, undergirded by a fundamental responsibility to caring for humans. While this strong sense of self-efficacy and identity contribute to April's plans to stay in healthcare for the rest of her career, she explained that she envisioned a different trajectory after finishing her MA apprenticeship.

> I can move into community help. You know, where you go to the homeless camps and you give, um, injections, vaccines, you make sure people have food. And I mean, it's, to me that would be to move out of the clinical aspect of it and go into something, um, a little more.

In this quote, we notice that April is galvanized by her commitment to caring for those most in need. For her, the MA certification provides her the means to act on this commitment.

Enrique

Enrique Romero, at the time of the interview, was a radiology technologist apprenticing to become an interventional radiologist, a position that carries more responsibility, higher status, and a significant increase in pay. Enrique had been a healthcare

provider in a variety of roles for at least 15 years and had completed previous training programs in that time to earn additional certificates. In his interview, he discussed experiencing fear in the past while assisting doctors in high-stakes vascular surgery. He described learning as the tool to combat that fear:

Whenever I do something, I don't like to be, um, scared or intimidated. Or just feel unsure of myself. I never like those feelings, you know, so I constantly have to be learning […] If you're willing to put in the work, you deserve that job. And, um, with me, I'm obsessed about it. And when I mean obsessed about it, I'm obsessed. Like I got books, I got drawings, you know, I got a lot of things that made me get over that fear.

Enrique displayed high self-efficacy as evidenced by the personal responsibility, intrinsic motivation, and engagement with the work that he described. He expressed a clear belief that learning and work hard are required to earn professional achievements. Having worked in frontline healthcare his entire career, Enrique described why he took on an apprenticeship program in his forties:

> That's like, um, the top of the mountain for, um, technologists. The highest you can go. […] And I actually had been begging and begging my director, you know, to do the program. […] I just, I love to learn and I always wanted to do it. […] I think I'm the future. […] I'm really dedicated. I could probably see myself becoming a teacher or a preceptor, you know? […] I think with the more education you get, you know, the less fear there is, the less anxiety there is, and you feel more comfortable and…you're gonna be, you know, head and shoulders above everyone, 'cause you're gonna have that confidence. […] I could definitely see myself working at least 15 years with [the other interventional radiologists in the RAP].

In these comments, we notice how Enrique, like Gary and April, connects professional identity, self-efficacy, and persistence intentions, while also providing his own help-related framing of the role, albeit a different one than the patient-centered role Gary and April expressed. Rather, Enrique explained that by becoming an interventional radiologist, he

can fulfill his professional potential, as well as be a guide for others coming up in the profession.

These three apprentices exemplify the impacts of a successful frontline healthcare worker RAP. They display high self-efficacy, have strong, resilient professional identities—even in the face of challenges, and intend to persist in healthcare for the rest of their careers. They also bring their own help-related framing—patient-centeredness or as educators—to their professional identities. Next, we share three composite cases that form a trajectory starting from the earliest stages of apprenticeship to the fully actualized frontline healthcare worker portrayed by Gary, April, and Enrique.

Case 1: Compassion from Transformation

This case, whom we name Carmen Torrez in reference to the central theme of *compassion from transformation,* represents the earliest stages along the trajectory of frontline healthcare apprenticeship. Ten apprentices contributed to this case, which highlights how past family experiences shaped an identity as a caregiver and hard worker, characteristics that supported Carmen's self-efficacy in beginning her journey from working as a homecare provider to a Certified Nursing Assistant (CNA) apprentice. As a child and young adult, Carmen cared for a beloved aunt with dementia, other family members with diabetes, and her own siblings.

> I grew up taking care of people, you know, my parents were divorced young, so I took care of my siblings at the age of about five. I have depositions from neighbors stating that I took care of my grandparents 'til the day they died. I think I've always been sort of a caregiver.

In this quote, Carmen's identity as a caregiver is notably double-sided as she positions herself as a longstanding caregiver and notes that others recognized her as such (Holland et al., 1998). Yet her account of this identity also displays some mitigation—"I think," "sort of"—perhaps reflecting her understanding that these experiences alone did not

qualify her in the way formal training in a RAP would. She responded eagerly to her union's effort to recruit her to a new CNA apprenticeship program:

> In order to be a CNA, you have to have the heart for it. […] Um, also, you are a hard-working person, if you are a CNA, because the job we do, it's not easy. But I'm not complaining about it because I love my job so it does explain me as a person, that I am a caring and loving person towards people.

Here, Carmen first offered qualifications for the work of being a CNA, depicting the work as difficult and compassionate. Indeed, the hours were long, the pay low, and the work arduous. She then positioned herself as a CNA ("the job we do"), thereby displaying not just a caregiver identity, but a professional identity as a CNA. She depicted herself as having these qualifications and fundamentally revealed herself to be compassionate and willing to do the hard work of caring. Carmen knew she had a true calling as a caregiver and the intrinsic qualities of empathy and "heart." She brings this caregiver self-efficacy and identity with her to the RAP; both support the development of the CNA professional identity.

As a CNA apprentice, Carmen worked in a nursing home, where she could put these qualities into practice. She explained what bolstered her self-efficacy in this hard work.

> What made me so confident about being a CNA was knowing, like I said, uh, gathering a relationship with the residents. […] That opens my heart up so much more knowing that I make a difference in their life and knowing that they trust me with their life. […] And a lot of them, after a care was given, the way somebody would just shake your hand and hold it. Saying thank you. […] That's what […] makes me go so much harder and stronger every day, knowing that I made a difference. […] They know that I, I, from the heart, genuinely care, as a person.

While an apprentice's self-efficacy may, as Bandura (1997) suggested, emerge from experiences of success, observing mentors, and recognition by supervisors, we notice nuances in Carmen's account that are distinctive. For her, the influential others whose recognition matters, rather than those who supervise her, are her patients. And importantly, her belief that through hard work, she can "make a difference" illustrates a form of self-

efficacy that is similar to what science education scholars refer to as critical agency—having the capacity to act in the discipline, but in ways that matter personally (Basu, 2008).

When Carmen spoke of her risky apprenticeship in a nursing home during the COVID-19 pandemic, her commitment to care was evident, as was her identity as a caregiver. Instead of dropping out of the program to avoid infection, she explained how working during the pandemic contributed to her professional identity as a CNA and her intent to persist in this hard work.

> [The pandemic] didn't impact me wanting to be or continuing to be a CNA. Um, it was tough though, like we were very short staffed and we got mandated [to work] a lot, but it is kind of like we, we made an oath, you know, to be there for our patients. […] And so we weren't gonna like, abandon them or anything. […] I've been in the Red zone [a unit for patients with COVID-19]. This is going to be my third time in Red zone with people who have COVID. So I am one of those that volunteered. […] And you know, it's very risky. [Laughs slightly] So I'm very different from other people because when, uh, we had the first Red zone, not a lot of people wanted to participate, into, um, caring for our patients on, with, with COVID because they were scared or because they had kids or they didn't wanna bring it to their home.

Working as a CNA apprentice during the pandemic was a transformative event that gave Carmen an opportunity to notice how she differed from others and bolstered her professional identity as a CNA with elements of bravery and unusually selfless compassion. These findings align with the findings of Li et al. (2021), who found that frontline nurses who had cared for patients during the COVID-19 pandemic had an enhanced professional identity in comparison with non-frontline nurses.

Case 2: Navigating Doubt

We name this case Naly Delgado for the central theme of *navigating doubt*. It represents the intermediate stages along the trajectory of frontline healthcare apprenticeship. Six apprentices contributed to this case, which reveals sources of self-doubt and shows how others position Naly while her self-efficacy and professional identity are developing along

her path from patient care assistant (PCA) to apprenticing as a licensed vocational nurse (LVN). From the beginning of her RAP, Naly had a passion for the work but worried about her ability to persist and succeed as an LVN.

> Um, well, I can't say I was confident because I did have my doubts. Sure. Um, I felt like I probably wasn't gonna be the best [LVN]. So I did have my doubts.

Here, Naly relates that she began the program with low self-efficacy beliefs. These beliefs stemmed from past experiences as a learner and as a worker, as well as in response to current barriers.

> I had a patient, well, a client, as a [PCA], they fell. And I felt very bad. […] And, um, I wanted to know more experience of how to transfer them to a bed. Um, what do you do when they fall?

Naly pointed out that this experience shook her confidence in herself; she brought that uncertainty with her to her RAP and added it to the insecurity she felt about herself as a classroom learner.

> Um, so this is my second semester, which I'm repeating. […] So last semester it was very, it was very stressful. I've never experienced anxiety like I [laughs] did. Yeah, it was, um, I had a lot of difficulties. […] Everything's new, you know, I'm traveling [for my RAP], it's new for my kids, you know, it's an adjustment for us.

This quote shows how anxiety and time apart from her young family were barriers that threatened the development of her self-efficacy and intent to persist; indeed, they contributed to her failure in her first semester. Participants in adult education programs, a population that overlaps in with participants in frontline apprenticeships in terms of barriers, often have negative past experiences with traditional education due to lower value placed on education by families relative to the need to contribute financially, disrupted learning experiences, unhelpful assessments, and negative, biased interactions with teachers and counselors (Flynn et al., 2011). These experiences can foster negative learning identities that can be as durable as these apprentices' positive identities as compassionate caregivers.

However, Naly was able to contrast these past experiences with positive new ones through her hands-on work with patients. As she made this progress, she displayed a more complex understanding of herself, with self-doubt changing shape as other facets and dimensions of identity at work emerging through interactions with patients. Tracy and Trethewey (2005) refer to this as a variable, fractured, "crystallized self." As she made her way through the RAP's first semester for the second time, her academic work improved and her professional identity became more robust.

> But coming in this time, um, I feel like because of the practice, and um, now knowing what to expect, I do feel a lot more comfortable. Like, I actually feel like the nurse, you know, that can be, like, meeting their expectations. […] I felt confidence when people would compliment me and say, 'Oh, you're a wonderful [nurse].' So that's what would like pump me up. That's what would make me feel, okay, I'm confident. Um, I, I've been told that I'm good. I'm a great [nurse] to my patients.

In this quote, we notice how others provided encouragement and acknowledgment that validated Naly's professional identity. Verbal encouragement by patients mitigated the negative identities and barriers she contended with and fostered a nascent sense of belonging—expressed with hedge words ("actually") and modal verbs that mitigate ("can be meeting" rather than "meet")—helping transform her self-efficacy beliefs. As the beliefs grew, the fact that others saw her and treated her as an excellent nurse contributed to an emerging professional identity. Naly credited the apprenticeship model, which built on her extensive healthcare work experience as a PCA, with helping her navigate doubt.

> Well, I am still learning. Um, so my confidence is not all the way up there yet. Yeah. Um, but I feel because I have that medical background [as a PCA] already in my belt, I'm a little bit more confident versus somebody who is brand new to, um, working in nursing because I'm not afraid to go talk to patients. I'm not afraid to, um, advocate for them.

Here, we notice Naly blending a durable identity as a caregiver, refined through years of work as a PCA, with an emerging identity as a professional nurse. She makes a crucial distinction between herself and someone who is "brand new" to nursing work, such as,

perhaps, a bachelor's of nursing student in their first real job. Apprenticeship itself, with its on-the-job training that builds on the apprentice's life and work experiences, mitigates Naly's fear and contributes to the development of self-efficacy, supporting her ongoing identity development as a nurse. Apprenticeship's structural elements, including situated work in authentic contexts, the interaction with peers and encouragement of mentors, support her movement from the periphery and her approach of the center of the nursing community of practice (Lave & Wenger, 1991). When asked if lingering doubts might lead her to leave the RAP early, Naly asserted her commitment to completion.

> I couldn't. I, I'm not a quitter. If I start something, I have to finish it, but I also finished, like I said, that, um, there's just things in my life that I have to change, and that was one of them. […] You know, as far as working my way up to becoming a nur-, an LVN or a nurse, you know, in, in the healthcare field, I had to start somewhere. And [the RAP] was, that was a, a great stepping ground right there for me. […] I feel great. [Laughs] I feel so great. I feel so, I actually, I'm so proud of myself that I made that step to go to the program, to take the apprenticeship program. And it feels so great knowing that I made an accomplishment in my life.

In this quote, Naly's emerging identity as a competent nurse is intertwined with her increasingly positive self-efficacy beliefs. Apprenticeship afforded Naly a structured but flexible opportunity to pursue her career dreams and work through her self-doubt. While acknowledging her challenges, Naly nonetheless affirms an intent to persist, citing her identity as "not a quitter" and someone who is proudly working her way toward becoming a nurse.

Case 3: Empowering (Co-)Mentorship

This case is named Erika Miller in reference to the core theme of *empowering (co-) mentorship*. It represents intermediate and late stages along the trajectory of frontline healthcare apprenticeship, as apprentices rely upon mentors and sometimes colleagues for support in reaching their goals. Seven apprentices contributed to this case. Erika recently completed a CNA apprenticeship. Before and during her apprenticeship, she was working as

an orderly in a hospital. Although at the time of the interview she was a practicing CNA, she came close to not passing her certification exams due to test anxiety. Her learning disability made some required assignments and the certification tests daunting, even though she excelled in the hands-on work. When Erika was in danger of failing the certification exam for a second and final time, her mentor, Mariah, provided practice tests, additional guidance, and advocacy:

> So [Mariah] set up this like binder for us, and it basically went through every single question and she would say, you gotta do this many questions and she would set up tests. She made this whole, like, chart for us. If we had, we had issues, she would speak to people, administrators. She really was great.

With the encouragement and support of her mentor, Erika passed the certification exam. Mariah not only intervened as needed to reduce or eliminate barriers, she helped Erika believe that she could succeed in apprenticeship and as a CNA.

> So, so I felt embarrassed to tell her, okay, the reason why I haven't been passing my tests was because I have a learning disability, but she ended up telling me to not be embarrassed because when it comes to hands-on, it doesn't mean you're, you're not good enough for the job. So she made me feel more confident and a little bit better about myself because I was having doubts. I would cry. I would be like, oh my God, I'm not good at this. […] I would get frustrated to the point where I wanted to give up, but she pushed me.

Mariah's interventions explicitly supported Erika's self-efficacy development and intent to persist at crucial turning points. In fact, Mariah did more than encourage; she aggressively asserted that Erika has the skills to succeed and that she would persist and fulfill her professional calling:

> She always said, "You're not gonna fail. You're not gonna fail. We don't do failures." She was like, "You are a good worker, but you are going to become a great person, a great CNA because you know what you're doing."

In these examples and throughout the interviews, apprentices raised mentoring as trajectory-changing. This aligns with research that emphasizes that mentors shepherd the

development of self-efficacy and an intent to persist through encouragement (Chelberg & Bosman, 2020; Choi & Yu, 2022). This focused role is perhaps particularly important for the FHCW apprentice, who faces more barriers to completion than healthcare workers in higher prestige roles. Erika herself recognized the crucial role that mentoring played in her apprenticeship experience:

> Well, I'll tell you this, and this is probably one of the, the biggest, um, the biggest things you gotta have. You gotta have support. You know, at the job. That's one of the biggest things, cuz if you don't have that support, you're not gonna get the proper training.

The mentor was an important source of that support, but Erika also flagged the key role of peer mentoring in her discussions of her apprenticeship cohort.

> Everybody supported each other. If, if one classmate wasn't able to comprehend certain information, we all, all of us came together and we put out our ideas and we all helped each other just come up with that […] good answer. […] Nobody was against each other. […One time,] I was very, like, I missed one thing on a competency. And so they said I had to redo it and I was very upset. [… My fellow apprentices] were like, "Stop and stop, stop, knock it off. You know, you know this, we went over this a hundred times. You were nervous, you know?" and I'm just like, Ugh, I don't like failing or I don't like having to take something again. And they were definitely behind me. So, I mean, we really were close-knit. […] We're still friends today.

In this quote, Erika positions herself as belonging to an empowering community that contributed directly to her self-efficacy development and intent to persist. Erika's quotes illustrate that, without the interventions of her mentor and fellow apprentices, she might not have completed her RAP.

Trajectory and Structural Analyses

Our first aim in this study was to characterize frontline apprentices' trajectories, considering the characteristics that fostered their intent to complete the RAP and persist in frontline healthcare work. Taken together, these cases—arrayed as a trajectory—tell a story

about how self-efficacy, professional identity, and an intent to persist develop for frontline healthcare apprentices. Chan (2013) described such development in terms of "learning trajectories and identity way-markers" (p. 372) that apprentices experience on their journeys from legitimate peripheral participation to assuming identities as healthcare professionals. Identity way-markers refer to the apprentice's status enroute to their profession; in Chan's (2013) study of bakers, this includes "novice, nascent baker, competent baker, shift supervisor." Our analysis highlights that frontline healthcare apprentices do not typically begin their RAP in the novice stage of expertise development; rather, they commonly begin with a resilient identity as a caregiver.

Caregiver identity is a construct that is typically discussed in the literature in the context of family caregivers, not people employed in frontline healthcare roles (Montgomery & Kosloski, 2009). Caregiver identity has been characterized as an informal role that slowly develops from extant roles (e.g., spouse, child, friend) and transforms over time in response to changes in caregiving tasks (Eifert et al., 2015; Montgomery & Kosloski, 2009). Experiences of giving, and sometimes of receiving, care, as well as role transitions were cited by interview participants as turning points that drew them into professional healthcare roles. It is noteworthy that nearly all participants identified themselves explicitly as unusually caring and compassionate people. Analysis of our interview data pointed to a relationship between their prior caregiving identity and the development of a professional identity as a healthcare provider. The resilient caregiver identity expressed by most participants seemed to drive them to first to consider entering the RAP to become a professional healthcare provider or to move up into a more responsible, higher-status healthcare position. At the same time, this caregiving identity helped sustain them during challenging points in their RAP, supporting their self-efficacy development and helping them and others begin to position them as healthcare professionals as they move closer to the center of the community of practice. While many accounts of the needs of the frontline worker/learner population focus on their deficits, the salience and power of these participants' caregiver identities emerge as a clear asset for their learning and persistence.

The developmental trajectory we present through our composite cases also provides a framework for understanding how apprentices differentiate between a social identity as a caregiver and their emerging identity as a healthcare professional. While most apprentices we interviewed asserted that they had innate caregiving abilities or significant experience as caregivers, those who held positions closer to the beginning of the trajectory relied more on these qualities as the basis of their confidence. Carmen and Naly both emphasized their longstanding roles as caregivers as the impetus for their entrance into the RAP. Both also cited others' compliments of their caregiving skills, rather than an identity as a professional, as reasons to continue in the RAP despite difficulties they experienced. Erika, farther along the trajectory and exemplifying the power of mentorship in this context, also cited the encouragement and support of others in her persistence, but she focused less on her original identity as caregiver and more on her future as a CNA. April and Gary both described life-changing experiences as both caregivers and care recipients that galvanized them to pursue their respective RAPs. However, they also spoke confidently of their identities as capable and compassionate healthcare professionals. A caregiver identity drove and supported each them as their professional identity developed.

Chan (2013) states, "Identity can […] be understood through the learning trajectories and identity way-markers […] apprentices experience as they transition, through attaining and applying craft skill and knowledge, from newcomer through apprentice to experienced practitioner" (p. 372). It is important to note that the trajectory reflected in these cases is not necessarily a linear route for any individual apprentice. Nonetheless, the composite cases represent salient points that deepen our understanding of common experiences of frontline healthcare apprentices and how those experiences contribute to success. The fundamental elements of CoP theory—identity formation, situated learning, and legitimate peripheral participation (Wenger, 1998; Lave & Wenger, 1991)—are woven throughout the three cases, each one representing a sort of identity way-marker for the FHCW apprentice. Apprentices necessarily begin on the periphery of the CoP they are apprenticing to (even though they have prior healthcare experience in other CoPs). Through situated interaction with

instructors, mentors, their cohort, and patients and their families, their self-efficacy grows and a professional identity develops. The ways that newcomers Carmen and Naly describe their more precarious positions on the periphery of their CoPs differ substantially from Gary and Enrique's descriptions of full, mature participation in the center of theirs. Movement through the trajectory takes time but also multiple forms of support, as described in Naly's need for patients' and coworkers' encouragement and Erika's reliance on strong mentorship.

Our second research aim was to identify structural elements of RAPs that contribute to apprentices' development into FHCW who demonstrate high levels of self-efficacy and in high-stress work environments, intertwined with a professional identity that is resilient despite challenges, and a conviction that healthcare is their permanent calling. Several structural elements of frontline healthcare RAPs themselves continually emerged from the data as both suited to the needs of FHCW apprentices and contributing to the development of professional identity, self-efficacy, and intent to persist. These structural elements include 1) robust opportunities for social learning; 2) emphasis on recruitment of incumbent healthcare workers; 3) tailored wrap-around supports and a flexible approach to the learner; and 4) the indispensable mentor. We use these structural elements to frame our cross-case analysis.

First, RAP structure provides many of the social supports and opportunities for active participation that drive movement from the periphery of a CoP to its center. Unlike nursing students in many university-based courses, apprentices are working in healthcare from the first days of the RAP. While the credentialing requirements of FHC occupations demand that apprentices not perform many tasks unsupervised until they have passed their credentialing exams, apprentices are able to shadow mentors, perform tasks under supervision, and participate in simulations with peers and instructors during class. This opportunity for hands-on work and peer, co-worker, and mentor feedback have the potential to strengthen self-efficacy development and contribute to the development of professional identity from the very beginning of the RAP experience. Given the research-based relationships between positive identity development, intent to persist, high performance, and quality care (Anderson

et al., 2020; Andrews et al., 2011; Cruess & Cruess, 2018), this element of RA is fundamental to workforce development professionals' goals of building the frontline healthcare workforce. Chan's (2013) finding that other people assign identity to apprentices before they have internalized that identity was replicated in our study as well, exemplified by Naly's (Case 2) and Erika's (Case 3) reflections on the way that others positioned them as capable professionals and students. Chan's three metaphoric phases of apprenticeship—*belonging, becoming,* and *being*—align with our findings. However, in our study, elements of *being* feature prominently in the Carmen's story (Case 1) and permeate the other two cases as well, given that all nearly apprentices interviewed spoke to the innate nature of compassion.

This is a second way that RA structure contributed to the development of self-efficacy, professional identity, and intent to persist. Nearly all of the frontline healthcare RAPs included in the study sample recruited only incumbent healthcare workers. This is likely wise on the part of RAP leaders, given our findings about the possible affordances of the existing caregiver identity and because frontline healthcare work could be shocking to those with no previous experience in it. Frontline healthcare work has been characterized as extreme or dirty work; that is, work that is perceived by others as dangerous, distressing, off-putting, and/or is done in service to a stigmatized population (Ashforth, 2020; Granter et al., 2015). Performed predominantly by women (Frontline Health Workers, 2022), this caring work can also be stigmatized as low-skilled. By recruiting among incumbent healthcare workers, RAP leaders likely avoid even greater turnover in their fields.

As evidenced by Carmen's reflections, incumbent workers bring caregiver identity and self-efficacy related to caregiving. These workers have already self-selected as healthcare providers. Nearly every apprentice interviewed spoke of their intrinsic caring qualities and, in most cases, of the transformative experiences that unveiled them. Apprentices credited traumatic experiences such as a debilitating car wreck, surviving cancer, caring for a dying loved one, and protecting a vulnerable patient from imminent

harm, as unveiling their calling and galvanizing their commitment to providing high-quality care. Their first-hand experience with the healthcare system as a patient or loved one of a patient was transformative, changing them forever. These self-narratives can contribute to the resilience of a professional identity, even through role transitions and, possibly, despite the dirty, distressing tasks that are more often than not part of frontline healthcare work.

Third, we found that tailored wraparound supports and flexibility are a structural element of frontline healthcare RAPs that contribute to the persistence of their apprentices. Carmen, Naly, and Erika all cited ways that RAP and labor union staff had provided services and targeted, just-in-time supports that helped them overcome the barriers that are common among the frontline worker population. These supports included tutoring; test preparation services; psychological counseling and coaching; transportation and childcare vouchers; hotel rooms when apprentices had to drive long distances for clinicals; assistance obtaining books, electronic tablets, and scrubs; and much more. Apprenticeship sponsors also offered flexibility for their adult worker-learners, eschewing the stricter, sink-or-swim approach of more traditional forms of schooling. For example, one apprentice failed his first certification exam because he had to miss classes to care for a family member that had had surgery; the union let him re-take that semester (likely at significant cost to the labor-management partnership that funds the RAP) and he successfully re-tested. When another apprentice and her cohort had trouble with a demeaning instructor at the community college that provided the RTI portion of the RAP, the union heard her concerns and proactively advocated for the apprentices.

The fact that their labor union or employer (or both) would pay for their schooling during apprenticeship was a key factor in every apprentice's decision to apply; indeed, without this funding, most of the apprentices interviewed would not have been able to pay for the training they received. For Carmen, the union's offer of college credit and a path to higher-prestige roles in the future (such as LPN or even social worker) contributed to her

decision to apply, despite obstacles and failures in career mobility in the past. Other apprentices credited the union's support as critical to their success.

A fourth RAP structural element that contributed to the development of self-efficacy, professional identity, and intent to persist is mentorship. Effective mentorship and co-mentorship, or the lack thereof, was mentioned by every study participant. Mentorship is strongly aligned strongly with the theory of cognitive apprenticeship (Brown et al., 1989) which emphasizes the role of mentor teachers in guiding learning. Self-efficacy is promoted by the observation of models (Bandura, 1997), as reflected in Erika's reliance on her mentor to lower test anxiety, perform better academically, and increase her well-being, all associated with self-efficacy (Warshawski, et al, 2019), which in turn promotes persistence (Wang, et al., 2017). Erika's professional identity development was strongly promoted by the encouragement of her mentor. The few participants who did not have access to a mentor lamented it and said it was something they would change about the program if they could. The workforces of many frontline, caring occupations are predominantly women (Frontline Health Workers, 2022); mentoring can be key in reducing barriers for women to develop professional identities, persist, and advance (Groves, 2021). Mentorship is an indispensable component of traditional trades apprenticeship programs, where apprentices work alongside the experienced journeyman. In frontline healthcare apprenticeships, such mentorship can be harder to establish, due to the fact that professional requirements prohibit most practice until after certification, as well as to the fast-paced nature of the frontline healthcare workplace itself. Some workers, like homecare providers, work without peers or supervisors present, forcing RAPs to be creative in how they develop mentoring programs. As they promoted self-efficacy and the development of professional identity, mentors had an influential role in intent to persist among their frontline mentees, a population with significant barriers to participation and persistence in workplace learning programs.

Indeed, another important finding that results from our cross-case analysis is that if the foundational needs of the frontline worker population are not met (by elements such as

economic incentives, wraparound services, academic supports and accommodations for anxiety and learning disabilities, and much flexibility), we would not be able to investigate these apprentices' self-efficacy and professional identity development. At any point along the trajectory discussed above, these functional, barrier-reducing components are necessary for success. As apprentices are engaging in the activities that may shape their self-efficacy and professional identity, such as receiving guidance from a mentor, they may be forced to leave their apprenticeship if these foundational, logistical, functional necessities are not met. In this fundamental way, findings among this frontline population may differ from more highly-resourced, highly-educated workplace learners that are much more frequently studied, such as medical students and university-based nursing students.

Implications

This multiple case study contributes to our understanding of the development of professional identity, self-efficacy, and intent to persist in an under-studied context. We learned about how this development among FHCW apprentices is predicated upon foundational needs being met. This study showed that while meeting these needs and reducing barriers are not the factors contributing to apprentices' success, they are crucial prerequisites. Another contribution of this work is the vital role of mentoring among this population of apprentices. In this study, through encouragement and modeling, mentors contributed greatly to the development of self-efficacy and professional identity in their mentees. However, mentors also directly contributed to apprentices' intent to persist at decisive moments. Mentors advocated for apprentices on the verge of failure; talked them through apprenticeship-ending crises of academic confidence; and ensured that apprentices with learning disabilities received the accommodations they needed. Their role is central to persistence among this population of worker-learners. RAP leaders should ensure that measures meant to reduce investments of time and money, such as online learning, do not limit or eliminate the crucial role of the mentor nor the hands-on experience that balances and complements the RTI and certification test preparation.

Among practical implications of this research is insight into what contributes to apprentices' success. RAP leaders and instructional designers may glean insights regarding who would likely be a successful apprentice (such as those who claim innate compassion or those with prior experience in frontline healthcare), how much effort to put into designing a mentorship element to their programs, and how to design their RAPs to support successful outcomes. They may also able to use the composite cases and trajectory identified here to contemplate how and why someone at one end of the trajectory, such as Gary or Enrique, would be able to peer-mentor someone at an earlier point, such as Naly. This research suggests a potential advantage for frontline healthcare RAPs that have union involvement. All but one of the RAPs included in this study had union involvement. In these RAPs, the union provided much of the crucial financial support and advocacy, mentorship, wraparound services, and other efforts at barrier reduction. This is unsurprisingly, as the dedicated role of the union is to represent its members. The one participating RAP that did not have union involvement covered the cost of the apprenticeship and paired apprentices with mentors but offered no other discernable wrap-around services and supports. Given our findings about the significance of these services and supports for the frontline worker population, RAPs without union involvement may want to find ways to nonetheless offer as many as possible.

Limitations and Future Research

As is typical in multiple case study research designs, there is a small sample, which allowed for contextualized exploration and exemplification of the phenomena we studied (Flyvbjerg, 2006). However, the transferability of findings from such a small sample is diminished. Since we asked RAP leaders to put us in contact with apprentices, data collection could have been subject to bias, because leaders may have sent us contact information for their most highly-performing apprentices. While we requested contact information for apprentices who had left their programs before completion, we received contact information for few such apprentices, and none responded to our invitations. As such, we were unable to include their valuable perspectives. Future studies that take a longitudinal approach of

recruiting at the beginning of RAPs and that include incentives may reduce issues of selection bias.

Our study provided insights from frontline workers' points of view, a perspective notably lacking in scholarly RA literature (Gallup, 2024). Future research should compare outcomes between programs with and without union involvement and investigate the role of community colleges in these findings. It would also be informative to compare the trajectory identified here with that observed in traditional building trades RAPs. Future investigations should bring to light innovative mentorship schemes in frontline RAPs, particularly in contexts with independent work, such as homecare and truck driving.

Conclusion

Using multiple case study, we shared three composite cases representing salient points along a trajectory to becoming a confident and compassionate frontline healthcare professional who displays high self-efficacy in their role, intertwined with a resilient professional identity, as well as a strong commitment to their healthcare profession. Early in their trajectories, apprentices described their motivation for career advancement as linked to compassion that originated from past daily and family experiences with healthcare issues, such as caring for a family member. As such, most apprentices began with a clear identity as a caregiver and high self-efficacy related to care-giving tasks. Despite their strong motivation, apprentices faced self-doubt in shifting from this caregiver role to their chosen professional role, in many cases stemming from a negative learning identity and learning barriers. Supporting them along the trajectory, mentors and peers were strong advocates, bolstering the self-efficacy development and persistence intentions of apprentices. They played a critical role in empowering frontline apprentices to overcome barriers and meet their goals. We learned that compassion-revealing transformative experiences and beliefs about one's innate caring qualities; opportunities for hands-on work experiences from the beginning of the RAP; and strong support from peers and mentors all contribute to the

development of these characteristics and to the apprentice's intent to persist in their chosen occupation. We found that wraparound supports designed to address apprentices' barriers to persistence are a necessary prerequisite in frontline healthcare apprenticeship programs.

References

Amoyaw, M., & Brown, D. (2018). *Apprenticeship America: An idea to reinvent postsecondary skills for the digital age*. Third Way.

Anderson H., Birks Y., & Adamson, J. (2020). Exploring the relationship between nursing identity and advanced nursing practice: An ethnographic study. *Journal of Clinical Nursing, 29*, 1195–1208. https://doi.org/10.1111/jocn.15155

Andrews, D.R., Burr, J., & Bushy, A. (2011). Nurses' self-concept and perceived quality of care: A narrative analysis. *Journal of Nursing Care Quality, 26*(1), 69–77. https://doi.org/10.1097/ncq.0b013e3181e6f3b9

Ashforth, B. E. (2020). Identity and identification during and after the pandemic: How might COVID-19 change the research questions we ask. *Journal of Management Studies*, *57*(8), 1763-1766. https://doi.org/10.1111/joms.12629

Ball, W.S. (2021, November 26). *Am I too old for nursing school?* Nurse Plus Academy. https://nurse.plus/become-a-nurse/am-i-too-old-for-nursing-school/

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman and Company.

Barglowski, K. (2018). Where, what and whom to study? Principles, guidelines and empirical examples of case selection and sampling in migration research. *Qualitative research in European migration studies*, 151-168. https://doi.org/10.1007/978-3-319-76861-8_9

Barton, A. J. (2019). Apprenticeships in nursing: Back to the future? *Journal of Nursing Education, 58*(1), 3-6. https://doi.org/10.3928/01484834-20190103-01

Basu, S. J. (2008). Powerful learners and critical agents: The goals of five urban Caribbean youth in a conceptual physics classroom. *Science Education*, *92*(2), 252-277. https://doi.org/10.1002/sce.20241

Bateman, T., Hobaugh, S., Pridgen, E., & Reddy, A. (2021). *U.S. healthcare labor market*. Mercer. https://www.mercer.us/content/dam/mercer/assets/content-images/north-america/united-states/us-healthcare-news/us-2021-healthcare-labor-market-whitepaper.pdf

Bergson-Shilcock, A. (2017). *Foundational skills in the service sector: Understanding and addressing the impact of limited math, reading, and technology proficiency on workers and employers.* National Skills Coalition.

Berik, G., & Bilginsoy, C. (2006). Still a wedge in the door: Women training for the construction trades in the USA. *International Journal of Manpower*, *27*(4), 321-341. https://doi.org/10.1108/01437720610679197

Berik, G., & Bilginsoy, C. (2002). Unions and women's training for the skilled trades in the U.S. *The Review of Black Political Economy, 29*(4), 97-122. https://doi.org/10.1007/bf02717299

Blouin, D. (2018). Impact of interpersonal relations on learning and development of professional identity: A study of residents' perceptions. *Emergency Medicine Australasia*, *30*(3), 398-405. https://doi.org/10.1111/1742-6723.12944

Boddy, C. R. (2016). Sample size for qualitative research. *Qualitative Market Research: An International Journal*, *19*(4), 426-432. https://doi.org/10.1108/QMR-06-2016-0053

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*(1), 32-42. https://doi.org/10.3102/0013189x018001032

Byram, J. N., Robertson, K. A., & Dilly, C. K. (2022). I am an educator: Investigating professional identity formation using social cognitive career theory. *Teaching and Learning in Medicine*, *34*(4), 392-404. https://doi.org/10.1080/10401334.2021.1952077

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., ... & Walker, K. (2020). Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing*, *25*(8), 652-661. https://doi.org/10.1177/1744987120927206

Chan, S. (2013). Learning through apprenticeship: Belonging to a workplace, becoming and being. *Vocations and Learning 6*, 367-383. https://doi.org/10.1007/s12186-013-9100-x

Chelberg, K., & Bosman, L. (2020). American Indian college student mentoring: A study to measure changes in self-efficacy. *Education Sciences*, *10*(2), 38. https://doi.org/10.3390/educsci10020038

Chi, Glaser, & Farr M (1988). *The nature of expertise*. L. Erlbaum Associates. https://doi.org/10.4324/9781315799681

Choi, E., & Yu, S. (2022). Effects of preceptors' mentoring function on novice nurses' self-efficacy and organizational commitment: A cross-sectional study. *Nurse Education in Practice*, *64*, . https://doi.org/10.1016/j.nepr.2022.103431

Coker, S. D. (2023). What adult educators can do to assist traumatized adults to learn. *New Horizons in Adult Education and Human Resource Development*, *35*(4), 183-185. https://doi.org/10.1177/19394225231213143

Collins, A., Brown, J. S., Newman, S., & Resnick, L. (1989). Knowing, learning, and instruction: Essays in honor of Robert Glaser. In *Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics*, 453-494. https://doi.org/10.4324/9781315044408-14

Collins, P.H., and Bilge, S. (2020). *Intersectionality*. John Wiley & Sons.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology*, *13*(1), 3-21. https://doi.org/10.1007/bf00988593

Cortini, M. (2016). Workplace identity as a mediator in the relationship between learning climate and job satisfaction during apprenticeship: Suggestions for HR practitioners. *Journal of Workplace Learning*, *28*(2), 54-65.

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Cruess, S. R., & Cruess, R. L. (2018). The development of professional identity. In T. Swanwick, K. Forrest, & B. C. O'Brien (Eds.), *Understanding Medical Education: Evidence, Theory, and Practice* (pp. 239-254). https://doi.org/10.1002/9781119373780.ch1

Cruess, R. L., Cruess, S. R., Boudreau, J. D., Snell, L., & Steinert, Y. (2014). Reframing medical education to support professional identity formation. *Academic Medicine*, *89*(11), 1446-1451. https://doi.org/10.1097/acm.0000000000000427

Davis, J. (2006). The importance of community of practice in identity development. *The Internet Journal of Allied Health Sciences and Practice, 4*(3), 1–8. https://doi.org/10.46743/1540-580x/2006.1111

Denzin, N.K. (1978). *Sociological methods: A sourcebook*. New York, NY: McGraw-Hill. https://doi.org/10.4324/9781315129945

Dill, J. S., Price-Glynn, K., & Rakovski, C. (2016). Does the "glass escalator" compensate for the devaluation of care work occupations? The careers of men in low- and middle-skill health care jobs. *Gender & Society*, *30*(2), 334-360. https://doi.org/10.1177/0891243215624656

Dreyfus H.L. & Dreyfus, S.E. (2020). Expertise in real world contexts. *Organization Studies 25*(5), 779-792. https://doi.org/10.1177/0170840605053102

Du, J., Dong, L. U., Wang, T., Yuan, C., Fu, R., Zhang, L., ... & Li, X. (2020). Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. *General Hospital Psychiatry*, *67*, 144. https://doi.org/10.1016/j.genhosppsych.2020.03.011

Eifert, E. K., Adams, R., Dudley, W., & Perko, M. (2015). Family caregiver identity: A literature review. *American Journal of Health Education*, *46*(6), 357-367. https://doi.org/10.1080/19325037.2015.1099482

Eren H., & Turkmen A. S. (2020). The relation between nursing students' levels of self-efficacy and caring nurse-patient interaction: a descriptive study. *Contemporary Nurse, 56*, 185–198. https://doi.org/10.1080/10376178.2020.1782763

Flynn, S., Brown, J., Johnson, A., & Rodger, S. (2011). Barriers to education for the marginalized adult learner. *Alberta Journal of Educational Research*, *57*(1), 43.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, *12*(2), 219-245. https://doi.org/10.1177/1077800405284363

Froessl, L. J., & Abdeen, Y. (2021). The silent pandemic: The psychological burden on frontline healthcare workers during COVID-19. *Psychiatry Journal,* 1-11. https://doi.org/10.1155/2021/2906785

Frost, H. D., & Regehr, G. (2013). "I am a doctor": Negotiating the discourses of standardization and diversity in professional identity construction. *Academic Medicine*, *88*(10), 1570-1577. https://doi.org/10.1097/acm.0b013e3182a34b05

Frontline Health Workers Coalition. (2022). *Frontline health workers: Who are they?* https://www.frontlinehealthworkers.org/frontline-health-workers

Gallup, A. (2024). What we know about registered apprenticeship: A systematic review and synthesis of 30 years of empirical research. *Economic Development Quarterly, 38*(1), 25-39. https://doi.org/10.1177/08912424231196792

Giazitzoglu, A., & Muzio, D. (2021). Learning the rules of the game: How is corporate masculinity learned and enacted by male professionals from nonprivileged backgrounds? *Gender, Work & Organization*, *28*(1), 67-84. https://doi.org/10.1111/gwao.12561

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine De Gruyter.

Granter, E., McCann, L., & Boyle, M. (2015). Extreme work/normal work: Intensification, storytelling and hypermediation in the (re) construction of 'the new normal'. *Organization*, *22*(4), 443-456. https://doi.org/10.1177/1350508415573881

Groves, T. (2021). Establishing mentoring programs for the advancement of women in the workplace. *New Horizons in Adult Education and Human Resource Development*, *33*(3), 66-69. https://doi.org/10.1002/nha3.20342

Haddad, L.M. Annamaraju, P., Toney-Butler, T.J. (2022). *Nursing shortage*. National Library of Medicine. https://www.ncbi.nlm.nih.gov/books/NBK493175/

Hatmaker, D. M. (2013). Engineering identity: Gender and professional identity negotiation among women engineers. *Gender, Work & Organization*, *20*(4), 382-396. https://doi.org/10.1111/j.1468-0432.2012.00589.x

Helper, S., Noonan, R., Nicholson, J. R., & Langdon, D. (2016). *The benefits and costs of apprenticeships: A business perspective*. US Department of Commerce.

Holland, D., Lachicotte, W., Skinner, D., & Cain, C. (1998). *Agency and identity in cultural worlds*. Harvard.

Hsu, H. Y., Li, Y., Dugger, S., & Jones, J. (2021). Exploring the relationship between student-perceived faculty encouragement, self-efficacy, and intent to persist in engineering programs. *European Journal of Engineering Education*, *46*(5), 718-734.

Hu, H., Wang, C., Lan, Y., & Wu, X. (2022). Nurses' turnover intention, hope and career identity: The mediating role of job satisfaction. *BMC nursing*, *21*(1), 1-11. https://doi.org/10.1186/s12912-022-00821-5

Hughes, V., Cologer, S., Swoboda, S., & Rushton, C. (2021). Strengthening internal resources to promote resilience among prelicensure nursing students. *Journal of Professional Nursing*, *37*(4), 777-783. https://doi.org/10.1016/j.profnurs.2021.05.008

Hyett, N., Kenny, A., & Dickson-Swift, V. (2014). Methodology or method? A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-being*, *9*(1), 23606.

Ibarra, H., & Barbulescu, R. (2010). Identity as narrative: Prevalence, effectiveness, and consequences of narrative identity work in macro work role transitions. *Academy of Management Review, 35*(1): 135–54. https://doi.org/10.5465/amr.2010.45577925

Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education, 25*(1), 15-28. https://doi.org/10.1080/02601370500309451

Kay, D., Berry, A., & Coles, N. A. (2019). What experiences in medical school trigger professional identity development? *Teaching and Learning in Medicine, 31*(1), 17-25. https://doi.org/10.1080/10401334.2018.1444487

Kaynak, N. E. (2019). "Teaching is like taking a trip": Two cases of pre-service teachers' early construction of professional identity with disparate outcomes. *International Journal of Progressive Education*, *15*(6), 122-133. https://doi.org/10.1080/10401334.2018.1444487

Klotz, V. K., Billett, S., & Winther, E. (2014). Promoting workforce excellence: Formation and relevance of vocational identity for vocational educational training. *Empirical Research in Vocational Education and Training*, *6*, 1-20. https://doi.org/10.1186/s40461-014-0006-0

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press. https://doi.org/10.1017/cbo9780511815355

Lerman, R. I., Eyster, L., & Kuehn, D. (2014). Can we upgrade low-skill, low-wage occupations? The case of apprenticeships in the long-term care occupations. *Journal of Women, Politics & Policy, 35*(2), 110-132. https://doi.org/10.1080/1554477x.2014.890835

Li, Z., Zuo, Q., Cheng, J., Zhou, Y., Li, Y., Zhu, L., & Jiang, X. (2021). Coronavirus disease 2019 pandemic promotes the sense of professional identity among nurses. *Nursing Outlook*, *69*(3), 389-398. https://doi.org/10.1016/j.outlook.2020.09.006

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.

Love, I., & McCarthy, M. A. (2018). *Apprenticeship and the future of nursing: An equity-based strategy to address the bachelor's degree gap*. New America.

McCarthy, M. A., Palmer, I., & Prebil, M. (2017). *Connecting apprenticeship and higher education: Eight recommendations*. New America.

McElhinney, Z., & Kennedy, C. (2022). Enhancing the collective, protecting the personal: The valuable role of composite narratives in medical education research. *Perspectives on Medical Education*, *11*(4), 220-227. https://doi.org/10.1007/s40037-022-00723-x

Mei, X., Wang, H., Wu, X., Wu, J., Lu, Y., & Ye, Z. (2022). Self-efficacy and professional identity among freshmen nursing students: a latent profile and moderated mediation analysis. *Frontiers in Psychology*, *13,* 1-8. https://doi.org/10.3389/fpsyg.2022.779986

Merriam, S.B. & Tisdell, E.J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage. https://doi.org/10.1016/s1098-2140(99)80125-8

Montgomery, R., & Kosloski, K. (2009). Caregiving as a process of changing identity: Implications for caregiver support. *Generations*, *33*(1), 47-52.

National Skills Coalition. (2020). *Lack of access to skills training hurts workers and businesses*. US-Skills-Mismatch-Fact-Sheet-2020.pdf (nationalskillscoalition.org)

Nichols, H.M., Swanberg, J.E., and Bright, C.L. (2016). How does supervisor support influence turnover intent among frontline hospital workers? The mediating role of affective commitment." *The Health Care Manager 35*(3), 266-279. https://doi.org/10.1097/hcm.0000000000000119

Norman, S. B., Feingold, J. H., Kaye-Kauderer, H., Kaplan, C. A., Hurtado, A., Kachadourian, L., ... & Pietrzak, R. H. (2021). Moral distress in frontline healthcare workers in the initial epicenter of the COVID-19 pandemic in the United States: Relationship to PTSD symptoms, burnout, and psychosocial functioning. *Depression and Anxiety*, *38*(10), 1007-1017. https://doi.org/10.1002/da.23205

Organization for Economic Co-operation and Development (2019). *Public data and analyses.* https://www.oecd.org/skills/piaac/publicdataandanalysis/

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578. https://doi.org/10.2307/11706 53

Persky, A. M., & Robinson, J. D. (2017). Moving from novice to expertise and its implications for instruction. *American Journal of Pharmaceutical Education*, *81*(9), 72-80. https://doi.org/10.5688/ajpe6065

Ragin, C. C., & Becker, H. S. (Eds.). (1992). *What is a case? Exploring the foundations of social inquiry*. Cambridge University Press. https://doi.org/10.1086/230446

Reed, D., Liu, A. Y.-H., Kleinman, R., Mastri, A., Sattar, S., & Ziegler, J. (2012). *An effectiveness assessment and cost-benefit analysis of registered apprenticeship in 10 states.* Mathematica Policy Research.

Saldaña, J. (2014). Coding and analysis strategies. In P. Leavy (Ed.), *The Oxford Handbook of Qualitative Research* (pp. 581-605). https://doi.org/10.1093/oxfordhb/9780199811755.013.001

Shen Y., Xie W., Wang X., Qu J., Zhou T., Li Y., et al. (2020). Impact of innovative education on the professionalism of undergraduate nursing students in China. *Nurse Education Today, 98.* https://doi.org/10.1016/j.nedt.2020.104647

Sinclair, S., Norris, J. M., McConnell, S. J., Chochinov, H. M., Hack, T. F., Hagen, N. A., ... & Bouchal, S. R. (2016). Compassion: A scoping review of the healthcare literature. *BMC Palliative Care*, *15*(1), 1-16. https://doi.org/10.1186/s12904-016-0080-0

Smiley, R. A., Ruttinger, C., Oliveira, C. M., Hudson, L. R., Allgeyer, R., Reneau, K. A., ... & Alexander, M. (2021). The 2020 national nursing workforce survey. *Journal of Nursing Regulation*, *12*(1), S1-S96. https://doi.org/10.1016/s2155-8256(21)00027-2

Stake, R. E. (1995). *The art of case study research*. Sage.

Stake, R. E. (2006). *Multiple case study analysis*. Guilford Press.

Stone, K. W., Kintziger, K. W., Jagger, M. A., & Horney, J. A. (2021). Public health workforce burnout in the COVID-19 response in the US. *International Journal of Environmental Research and Public Health*, *18*(8), 43-69. https://doi.org/10.3390/ijerph18084369

Tate, K. A., Fallon, K. M., Casquarelli, E. J., & Marks, L. R. (2014). Opportunities for action: Traditionally marginalized populations and the economic crisis. *Professional Counselor*, *4*(4), 285-302. https://doi.org/10.15241/kat.4.4.285

Tomer, A., & Kane, J.W. (2020). *To protect frontline workers before and after COVID-19, we must define who they are.* Brookings Institution.

Tracy, S. J., & Trethewey, A. (2005). Fracturing the real-self↔ fake-self dichotomy: Moving toward "crystallized" organizational discourses and identities. *Communication Theory*, *15*(2), 168-195. https://doi.org/10.1111/j.1468-2885.2005.tb00331.x

U.S. Bureau of Labor Statistics. (2022). *Occupational outlook handbook: Healthcare occupations.* https://www.bls.gov/ooh/healthcare/home.htm

U.S. Department of Labor. (2022). *FY 2021 data and statistics.* https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021

Wang, L., Tao, H., Bowers, B. J., Brown, R., & Zhang, Y. (2017). Influence of social support and self-efficacy on resilience of early career registered nurses. *Western Journal of Nursing Research*, *40*(5), 648-664. https://doi.org/10.1177/0193945916685712

Warshawski, S., Bar-Lev, O., & Barnoy, S. (2019). Role of academic self-efficacy and social support on nursing students' test anxiety. *Nurse educator*, *44*(1), E6-E10. https://doi.org/10.1097/nne.0000000000000552

Wenger E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge University Press. https://doi.org/10.1016/b978-0-7506-7293-1.50004-4

Willis, R. (2019). The use of composite narratives to present interview findings. *Qualitative Research*, *19*(4), 471-480. https://doi.org/10.1177/1468794118787711

Windisch, H. C. (2016). How to motivate adults with low literacy and numeracy skills to engage and persist in learning: A literature review of policy interventions. *International Review of Education, 62*(3), 279-297. https://doi.org/10.1007/s11159-016-9553-x

Wortham, S. (2004). The interdependence of social identification and learning. *American Educational Research Journal, 41*(3), 715. https://doi.org/10.3102/00028312041003715.

Wyatt, T. R., Rockich-Winston, N., White, D., & Taylor, T. R. (2021). "Changing the narrative": A study on professional identity formation among Black/African American physicians in the US. *Advances in Health Sciences Education*, *26*(1), 183-198. https://doi.org/10.1007/s10459-020-09978-7

Yao, Y., Zhao, S., Gao, X., An, Z., Wang, S., Li, H., ... & Dong, Z. (2018). General self-efficacy modifies the effect of stress on burnout in nurses with different personality types. *BMC Health Services Research*, *18*(1), 1-9. https://doi.org/10.1177/0046958020957114

Chapter 4

Gallup, A. & Svihla, V. (2024). Development of the Survey of Transformative Apprenticeship Experiences (STAE) – a measure of professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices [Unpublished manuscript].

Development of the Survey of Transformative Apprenticeship Experiences (STAE)—a measure of professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices

Abstract

Attrition is high among U.S. frontline healthcare workers. Registered apprenticeship is increasingly used as an on-ramp into these positions, but completion rates are low. Self-efficacy and professional identity support persistence in other contexts, but little is known about their development among low-wage workers. We used survey development methodology and to design, pilot, and evaluate the Survey of Transformative Apprenticeship Experiences (STAE) to measure professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices (n=71). Based on factor analysis, the STAE measures persistence intentions and mentoring, as well as caregiver and healthcare professional variants of both self-efficacy and identity, resulting in a 47-item survey ready for use in studies and RA programs. Regression modeling showed that caregiving self-efficacy and active learning predicted healthcare professional identity, which in turn predicted persistence intentions. Our findings support the use of active learning approaches in RAPs.

Keywords: Apprenticeship, professional identity, self-efficacy, persistence intentions, survey development

Introduction

Frontline healthcare workers (FHCWs) provide direct, essential care to patients under stressful conditions and often for low wages. They include homecare providers, community health workers, medical assistants, nursing assistants, and others. Many FHCWs stay in their jobs despite the demanding and sometimes dangerous conditions (Novilla et al., 2023) because they are resilient, caring and, crucially, because they see themselves as having the unusual capacity, the "heart," to do the job (Gallup & Svihla, 2024). However, severe shortages of frontline healthcare workers persist in the U.S., exacerbated by the COVID-19 pandemic (Johnson, 2022).

High demand for FHCWs has encouraged workforce developers, employers, and unions to adapt the registered apprenticeship (RA) model, historically and extensively used in the building trades, to transition incumbent workers into higher-skilled roles and create a pipeline of prepared professionals to fill growing vacancies. Government-regulated registered apprenticeship programs (RAPs) include on-the-job learning and (OJL) classroom-based related theoretical instruction (RTI) outside work hours. RAPs typically offer mentorship, structured wage increases, and industry-recognized credentials.

While these components of RA make it a promising model for the frontline workforce, high attrition rates in RAPs (Jones et al., 2021) and in frontline healthcare occupations (Linos et al., 2022), combined with the high demand, suggest a need to better understand what contributes to persistence among these apprentices. Our previous research characterized a developmental trajectory of self-efficacy, professional identity, and persistence intentions among frontline healthcare apprentices and suggested key roles for caregiver identity and caregiver self-efficacy in the earlier stages of that trajectory (Gallup & Svihla, 2024). That research also suggested that wraparound supports and mentoring are crucial prerequisites for the success of frontline healthcare RAPs. Now, we build on that knowledge to create a tool— Survey of Transformative Apprenticeship Experiences

(STAE)—to measure professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices.

Research Purpose

Knowledge of the development of professional identity, self-efficacy, and persistence intentions among adult learners in low-prestige or low-wage occupational contexts remains limited. In better-studied adult learning contexts, such as university programs and higher-prestige occupations like physicians, the development of professional identity and self-efficacy have been shown to support persistence intentions (Hanauer et al., 2016; Hsu et al. 2021). However, there is a gap in our understanding of how these characteristics develop among worker-learners in lower-prestige, lower-wage frontline occupations (Gallup, 2024). Low-wage workers are offered opportunities for workplace learning, mentorship, and advancement less frequently (Fuller & Raman, 2023; Snyder et al., 2018; Hedayati-Mehdiabadi & Li, 2016), and are less able to take advantage of the opportunities that do arise, given the necessity of working multiple low-wage jobs, lack of childcare and transportation, and other challenges. As a group and compared to the workforce as a whole, frontline workers have lower educational attainment; are more likely to be non-white, immigrants, women, and single mothers; and are more likely to earn low wages (Blau et al., 2021). These demographics suggest that, as members of minoritized groups, frontline healthcare workers may experience systemic and personal barriers to persistence that their counterparts in higher-prestige occupations likely do not, and in ways that may be meaningful for their developmental trajectories and outcomes. The current study aims to address this gap by using survey development methodology followed by regression modeling. In light of these aims, our study answers the following research questions:

- To what extent does the Survey of Transformative Apprenticeship Experiences (STAE) provide useful information about frontline apprentices' professional identity, self-efficacy, and persistence intentions?

- To what extent do frontline healthcare apprentices' self-efficacy and identity predict their persistence intentions?

Literature Review

Social learning theorists Lave and Wenger (1991) described apprenticeship as a workplace learning model in which apprentices gradually move from the periphery of a community of practice to its center, learning new knowledge, skills, and self-confidence through participation and interactions with more experienced practitioners. In doing so, they transform the community and their own identities. Professional identity development, its interplay with self-efficacy, and their combined influence on persistence intentions, have been well-studied among university students and higher-prestige professions, such as physicians, but little attention has yet been paid to their development among workers in lower-prestige occupations.

Self-efficacy contributes to professional identity and persistence

Bandura (1997) described self-efficacy as a person's confidence in their ability to achieve a goal, carry out a task, or succeed in specific situations. Self-efficacy development is dynamic and responsive to new experiences and powerfully predicts engagement, achievement, and persistence (Bandura, 1997; Lipscomb et al., 2022; Venskus & Craig, 2017; Wang et al., 2017). Among nurses, high self-efficacy is supportive of persistence (DeSimone et al., 2018). It may be that RA itself is uniquely suited to build self-efficacy and encourage persistence in populations that tend to participate in frontline healthcare RAPs. In a study of older adults in the U.S. based on a large sample (n=2,580) from the Program for International Assessment of Adult Competencies (PIACC), Yamashita et al. (2019) found that the development and utilization of job-related skills led to positive attitudes that reinforced participation in workforce training.

Conversely, low self-efficacy is associated with low academic performance, low resilience, and high turnover intentions (Böhn & Deutscher, 2022; Gibbons, 2010; Lee et al., 2012; Vardaman et al., 2020). Self-efficacy also contributes over time to the development of professional identity. In a large survey study of nursing students, Zhao et al. (2023) found that social support from friends and co-workers improves self-efficacy, and that both social support and self-efficacy were positively correlated with professional identity during the COVID-19 pandemic. As a context-dependent construct, self-efficacy is typically measured in relation to particular kinds of tasks (Bandura, 1997). In this study of frontline healthcare apprentices, we define healthcare professional self-efficacy as an apprentice's ability to do the professional role they are apprenticing for.

Given the role of self-efficacy in persistence and healthcare professional identity development, it is useful to understand what contributes to the development of self-efficacy itself. Research among healthcare providers and students has shown that education and training, particularly active learning activities, can promote the development of self-efficacy. For example, Abusubhiah et al. (2023) found that face-to-face and multimodal interventions (as opposed to solely online learning) and simulation activities support self-efficacy development among student nurses, while Chiang et al. (2022) found that using immersive virtual reality training improved hospital-based healthcare providers' self-efficacy related to a complex medical procedure. Nørgaard et al. (2012) found that communication training involving role plays and simulations supported the development of self-efficacy among healthcare professionals, including nursing assistants, and medical secretaries.

Identity contributes to persistence

Lave and Wenger (1991) characterize identity development as a process of transformation, inseparable from learning. Through active participation in a shared community of practice, practitioners transform that community and are also personally transformed as they develop not only new knowledge and skills, but also new attitudes and

behavior. Individuals have multiple identities; that is, they have overlapping and interconnected conceptions of themselves that they construct throughout their lives in a dynamic, social, and continuous process (Holland et al., 1998). In developing a healthcare professional identity, a worker slowly internalizes the norms and values of their occupation, leading them to think, feel, and behave like a healthcare professional over time (Cruess et al., 2014).

Strong links between professional identity development and persistence have been established through research. In a survey study of 493 registered nurses, Hu et al. (2022) found that professional identity was negatively correlated with turnover intention; in other words, professional identity was linked to staying in one's job. Other recent research has found similar relationships between professional identity and persistence intentions among doctors (Zhang et al., 2021), hotel staff (Wang et al., 2020), and fine dining restaurant waiters (Jerez Jerez et al., 2023). In addition to their location in other countries, these contexts differ appreciably from frontline healthcare apprenticeship in educational requirements, prestige, or stress levels associated with the position.

Caregiver self-efficacy and identity contribute to healthcare professional identity

Our prior research (Gallup & Svihla, 2024) suggested that frontline healthcare apprentices often enter their RAP with existing self-efficacy and identity as caregivers, developed through transformative experiences providing care to family members and others. We found that these characteristics may contribute to the evolution of a healthcare professional identity over time, particularly in the early stages of a RAP. This finding is not strongly supported in the existing literature on caregiver self-efficacy, which has centered on family caregivers of people with dementia and on social workers, roles in which higher self-efficacy predicts lower distress and heightened ability to cope with the emotional difficulties of the work (Steffen et al., 2022). This research is often grounded in caregiver identity and change theory (Montgomery & Kosloski, 2009), which holds that caregivers experience

nearly unavoidable negative or dysfunctional identity changes as they add the caregiver role to established roles (e.g. sister, daughter, wife) and the care recipient's condition continues to progress, causing further distance and dissonance between the former identity and the new caregiver identity. To the extent the caregiver can improve their caregiver self-efficacy and gain social support, the better they are able to manage stress and become more resilient throughout the unavoidable identity changes (Wu & Pooler, 2014). Though research in this area does not frequently describe positive predictive relationships between caregiver self-efficacy and professional healthcare identity, Montgomery & Kosloski (2009) identify a final transitional phase of caregiving, in which care is turned over to formal healthcare providers. These researchers identify this phase as a turning point in which caregivers may consider professional healthcare roles.

In this study, we define caregiver self-efficacy as an apprentice's beliefs about their ability to provide high-quality care to patients, family members, and other loved ones. We treat this construct as distinct from healthcare self-efficacy. Similarly, we draw some of our understanding from the research that defines caregiver identity as necessarily emerging from distress and dissonance, though for the purposes of this study we focus on more positive attributes of a fully developed caregiver identity we observed through our prior research. As such, we define caregiver identity as a dynamic self-conceptualization as someone who has an innate calling to provide compassionate care to others.

Learning supports and mentoring contribute to self-efficacy

Existing research has identified complex contributors to attrition in RAPs of all types, including poor working conditions, lack of social support, financial issues, length of training and economic downturns (Bilginsoy, 2018; Böhn & Deutscher, 2022). Contributors to persistence and completion in RAPs include provision of wraparound supports, financial incentives, higher quality training, and more purposeful inclusion of women, apprentices of color, and individuals with learning differences (Rege et al., 2023). Bilginsoy (2018) and

Kuehn (2019) both found that joint programs (those sponsored jointly by a labor union and an employer) had consistently higher completion rates than non-joint (employer-sponsored only) programs. It is possible this may partly have to do with the learning and social supports more commonly found in joint programs. It stands to reason that apprentices earning relatively low wages and who have a higher likelihood of foundational skills gaps would benefit crucially from wraparound services designed to address their specific economic and learning needs (Bergson-Shilcock, 2017).

Our prior research (Gallup & Svihla, 2024) found that persistence intentions among frontline healthcare apprentices are predicated upon foundational needs being met. While learning supports do not directly cause apprentices' success, they are key prerequisites. A majority of frontline healthcare workers belong to marginalized populations who often experience structural barriers to access and persistence in workforce training (Blau et al., 2021; Fuller & Raman, 2023). Learning supports such as flexible schedules, accommodations for learning differences, tutoring, transportation vouchers, and childcare assistance can help even the playing field, providing apprentices with a stable foundation upon which to do the hard work of learning and development. These may be among the core strengths of RA for frontline workers.

There is research support for the argument that specific learning supports contribute to the development of self-efficacy among college students from minoritized populations. Multiple studies have found that college transition programs offering wraparound services such as individual advising, career fairs, mock interviews, and mentorship supported the development of major and career self-efficacy for first generation, low-income, and racially minoritized students (Hypolite et al., 2022; Kezar et al., 2019; Kezar et al., 2020). In a survey of adult community college students, a population similar to frontline healthcare workers Myran & Sylvester (2020) found that student self-efficacy increased significantly among learners who completed a workforce development program and that supports like tuition

support, childcare assistance, and bus passes contributed to the increases. Locations that served the most vulnerable learners saw some of the largest self-efficacy improvements.

Another type of learning support, mentoring, is an RA requirement and possibly a core strength of the model. The mentor is also often referred to as a journey-worker, preceptor, or trainer (Healthcare Career Advancement Program, 2017). Tenenbaum et al. (2001) characterized mentorship as serving three distinct purposes. Psychosocial mentoring includes the socioemotional help that mentees receive from mentors, including encouragement, understanding, counseling, and role modeling. Instrumental mentoring includes skills-building help that mentees receive, including coaching, instruction, and assistance with difficult tasks. A third purpose, networking, involves mentors helping mentees make connections in the profession, though this is less relevant in RAPs, which are fundamentally jobs and have the necessary networking built in. Numerous studies have shown that mentoring increases healthcare workers' self-efficacy (Choi & Yu, 2020; Jnah & Robinson, 2015; Musabwasoni, 2020), which can in turn promote persistence intentions (Hart, Brannan, & De Chesnay, 2014; Moss, 2022; Pham et al., 2014).

Methods

In this study, we used survey development methodology (Boateng et al., 2018; Dillman et al., 2016) and regression modeling to answer the research questions. We took a pragmatic stance, reflecting the notion that methods should be chosen based on their utility in answering research questions with real-world significance (Tashakkori & Teddlie, 2010). This stance aligns with our mixed methods approach that includes a qualitative analysis of responses to open-ended survey questions for initial quality assurance, as well as quantitative analyses of responses to close-ended survey questions.

We carried out our mixed-methods, exploratory, non-probability study through six sequential phases that fall within Boateng et al.'s (2018) three phases of survey development: item development, scale development, and scale evaluation (Figure 4.1). Following

development, we implemented the survey (n = 71), and made additional revisions based on analysis of these data, resulting in a final version of the survey. We then used regression modeling to examine factors that predict apprentices' persistence intentions and development.

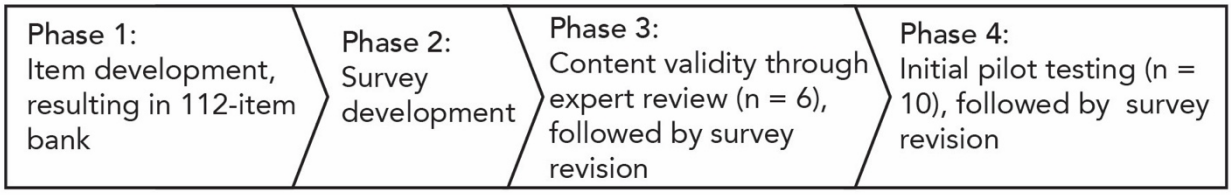


Figure 4.1 Sequence of research design

Phases 1-4: Survey Development

In Phase 1, we developed a 112-item survey bank. The choice and development of these initial items were grounded in theory and review of literature to ensure that the survey results would be useful (DeVellis, 2016). The first author's systematic literature review of the registered apprenticeship literature (Gallup, 2024) and the results of our previous qualitative multiple case study analysis (Gallup & Svihla, 2024) both contributed to item development. For instance, in Gallup & Svihla (2024) we found that caregiver identity and caregiver self-efficacy supported early stages of the development of professional identity and persistence intentions, so we included items in the survey bank related to these constructs. We adapted most items from existing research-based surveys on the study constructs (Ambuehl & Inauen, 2022; Harkness et al., 2010). For example, researchers have developed measures of self-efficacy and identity among minority university students (Chemers et al., 2011; Robnett et al., 2015), caregiver identity among professional social workers (Seibert & Seibert, 2005), and mentoring relationships in graduate school (Tenenbaum, et al., 2001). We adapted items from two existing self-efficacy scales to add caregiver self-efficacy items to our survey bank (Schwartzer & Jerusalem, 1995; Steffen et al., 2002). The bank contained closed- and open-ended survey items to collect both quantitative and qualitative data to

measure five constructs—caregiving self-efficacy, healthcare self-efficacy, caregiving identity, healthcare professional identity, and persistence intentions—and gain information about learning supports, mentoring, and apprentice demographics (Table 4.1).

Table 4.1. Constructs measured by questions in the survey bank, with sample items

Study constructs	Sample item
Healthcare professional identity includes the work to position oneself as belonging in a specific professional community and role, as well as the experiences of being in/excluded by others in that community.	Being a healthcare professional is an important part of who I am.
Caregiver identity includes the work to position oneself as belonging in a specific community and role as a caregiving person, as well as the experiences of being in/excluded by others who give or receive care.	Being a caregiver sets me apart from others.
Healthcare professional self-efficacy is the degree to which one feels confident and capable of performing tasks as a professional healthcare provider.	How confident or unconfident are you that you can communicate effectively with patients and their families?
Caregiver self-efficacy is the degree to which one feels confident and capable of performing caregiving tasks.	How confident or unconfident are you that you can deal well with unexpected events in the care of another person?
Intent to persist reflects the respondents' plans and commitments to continue educational and career goals.	At this moment in time, how strong or weak would you say your commitment is to complete your apprenticeship program?
Learning supports encompass the various learning experiences and program supports that may be present in RAPs.	How frequently or rarely does your RTI include the following: Lectures
Socioemotional mentoring includes the socioemotional help that mentees receive from	My mentor encourages me in my work.

mentors, including encouragement and coaching.	
Instrumental mentoring includes the skills-building help that mentees receive from mentors, including understanding, counseling, role modeling, instruction, and assistance with difficult tasks.	My mentor helps me do assignments or prepare for tests that otherwise would have been difficult to complete on my own.

In Phase 2, we selected items from the bank and made decisions about question format and deployment. We used the tailored design approach to survey development (Dillman et al., 2016), which limits survey length and complexity, avoiding requests for sensitive information unnecessary for our research purposes. This approach can increase validity by encouraging responses and reducing error. We created Likert statements on 7-point bipolar item-specific scales, with a middle item such as "neither uncertain nor certain" to reduce measurement error (O'Muircheartaigh et al., 2000). We also consistently presented each scale with the most negative option listed first, such as "very uncertain," to avoid question order effects (Dillman et al., 2016). We chose several distinct items from the bank for each of the five constructs, as well as for learning supports, mentoring, and demographic items. We refined and formatted the items according to the literature (De Vaus, 2013; Dillman et al., 2016). For example, we tried to write all items in accessible language, grouped related questions together, placed demographic questions at the end of the survey, and included an optional text box at the end for respondents to share concerns or additional information. The checklist in Appendix B provides a comprehensive list of considerations that were addressed in Phase 2 in order to enhance content validity in the final survey (Sireci, 1998). At the end of Phase 2, we produced a 64-item draft survey.

Phase 3 involved establishing content validity through expert review (n=6). In this process, experts who are deeply familiar with the topic or the target audience share insights on items, their comprehensiveness, and the likelihood of comprehension (Dillman, 2016;

Sireci, 1998). We created a review tool with detailed instructions and explanations of the study target population, contexts, and constructs (Appendix C). We turned Likert items into constructed response items to assess whether the purpose of the question was clear from the stem. The tool listed each of the survey items, solicited a rating on a 4-point scale of relevance ranging from not appropriate for the survey to very appropriate for the survey (Davis, 1992), and provided space for comments and questions after each item. This approach to expert review can be used with novel scale development (Gallup & Svihla, 2021). We asked consented former and current RA leaders (n=4) and experienced healthcare practitioners (n=2) to rate each item with the review tool and then conducted an interview with each expert to discuss their responses, recording their reflections on the tool. Experts provided a range of feedback about items, including that some were repetitive, confusing, too complex, less relevant to the experience of the target population, or biased. For example, two survey items asked respondents about their "barriers" to persistence. Several experts felt that the use of this term suggested negative assumptions about apprentices, so we modified the items to remove that word. Collecting this qualitative data along with the quantitative ratings data helped us achieve saturation on all the constructs in the survey (Lasch et al., 2010). Based on experts' ratings and feedback, we revised the survey items and eliminated two items, leaving us with a revised and clarified 62-item, pilot-ready survey at the end of Phase 3.

In Phase 4, we piloted the survey with a convenience sample of consented former frontline healthcare apprentices and current frontline healthcare workers (n=10) who were representative of populations similar to those for whom the survey was intended. Collecting input on comprehensibility and appropriateness from participants who are similar to the target population is a way to enhance content validity in qualitative research. Triangulation of responses from participants in Phases 3 and 4 enhanced the credibility of our findings (Lasch et al., 2010). In Phase 4, we provided a review tool similar to the one we provided to experts, but without the detailed descriptions of constructs and audience. We conducted what Dillman (2016) refers to as a cognitive interview with each participant, while they completed the

survey, discussing their feedback and likely response to each item. These reviewers provided valuable qualitative data on item comprehensibility, relevance to participants' experiences, and survey length and usability. For example, several survey items asked respondents to select images that best represented the overlap of their current self-image and the identity of a healthcare professional or of a caregiver. This confused multiple participants, leading us to eliminate the item type entirely. These participants' feedback, combined with that we had received from expert reviewers, helped us further correct errors and ambiguous language in the survey, reducing it to 58 items. We took care to retain at least two close-ended items for each of the five constructs, as well as for learning supports and mentoring.

Data collection

The survey had 58 items, most of which were Likert statements written as simple concepts (Ruel et al., 2015) with a 7-point bipolar scale. We included constructed response items to provide context and fuller understanding of each construct. The survey included orienting items and transitions; questions about elements of the RAP and related experiences, including the occupation, duration, time spent in the RAP, the presence and role of mentors; the use of distance learning; participation in a pre-apprenticeship; the involvement of a community college; and the existence and types of wraparound supports offered. Demographic questions appeared at the end and, following inclusive best practices for asking such questions, included a combined race/ethnicity question, an inclusive gender identity question, and a question on disability/ability status that includes a question about learning disability (Fernandez et al., 2016). These demographic and context questions allowed us to link demographic and program attributes to responses to support our understanding of survey comprehensibility and usability. We collected online survey responses for six weeks using a password-protected GoogleForm linked to a GoogleSheet, which we exported as an Excel file for analysis in SPSS. Each survey response was automatically linked to a unique timestamp.

We recruited a convenience sample of respondents that included current apprentices (n = 35) and current FHCWs, most of whom were former apprentices (n = 36). Collecting data from these two groups maximized the variability within the set of respondents. Respondents were from a range of frontline positions that included direct care, public health, long-term care, mental health, and other occupations. We contacted respondents through the first author's professional contacts, national published lists, and internet searches for frontline healthcare RAPs, using snowball techniques to expand our reach. We asked RAP leaders to distribute the survey via email to apprentices or, preferably, to distribute the URL in class and provide time to complete it there. We did not compensate the respondents. However, in alignment with social exchange theory (Blau, 1964) and the tailored design method (Dillman et al., 2016), we emphasized in recruitment materials and in the survey itself that responding carries minimal risk and could benefit other healthcare apprentices in the future.

Data on the number of frontline healthcare apprentices in the United States does not yet exist. In addition, the small size of these programs, their disconnection from other similar programs, and the difficulties associated with contacting RAP leaders and convincing them to be a part of a research study all contribute to the difficulty of using a probability research design and obtaining a large sample size for the use of inferential statistics to estimate the distribution of these characteristics in the target population. We included FHCWs, who have very similar characteristics to the target audience, in the sample for the purposes of survey validation. Given this non-probability research design, findings from the study are not generalizable to the entire population of frontline healthcare apprentices but do serve the study goals. Nonprobability sampling is appropriate for exploratory studies that involve testing of ideas and experimentation (Dillman et al., 2016).

Though we use non-probability sampling techniques, we reduced sampling and coverage error by seeking as many respondents as possible from different types of frontline healthcare occupations in various geographical locations, both rural and urban. The setting

was primarily RAPs for FHCWs, though some respondents worked in hospitals and long-term care facilities. The survey was anonymous and to maintain that anonymity, respondents were not asked to identify their location, so knowledge of apprentices' location is based on our records of which RAPs agreed to give the survey to apprentices. Most frontline healthcare RAPs are concentrated in the Northeast, Mid-Atlantic, and West Coast regions of the United States. Most RAPs that distributed the survey to apprentices were based in these regions, though several were based in Western, Southern, and Midwestern states. Apprentices took the online survey in class, during the OJT portion of their RAP, or on their own time, either on their mobile device or a computer. FHCWs took the online survey at work or on their own time.

Data analysis

Qualitative Analysis

We analyzed the qualitative survey data to gain richer insight into each construct and into apprentice experiences. We deductively coded to check for saturation of themes. For example, we coded responses such as "I'm much more confident in standing up for myself" and "I learned how to keep a deep breath when difficult situations are hard" as self-efficacy, and comments such as "I want to become a nurse and this opportunity helps me to start" and "I always complete what I begin" as persistence intentions.

Iterative qualitative analysis using this deductive approach and triangulation of responses to each item from participants across both survey development and implementation phases enhanced the credibility of our findings. We also inductively coded responses to identify key themes in the data that enhanced or extended beyond the constructs under study. To further triangulate, both authors discussed aspects of the analysis on a regular basis in order to enhance the validity and confirmability of findings (Lasch et al., 2010). We also compared the findings from the qualitative analysis with the outcomes of the quantitative items that measured the same constructs in order to check for disagreement between them.

Quantitative Analysis

We analyzed the quantitative data to check for outliers, calculate descriptive statistics, and conduct exploratory factor analysis (EFA) and regression modeling. Estimates for requisite sample size for EFA vary considerably, in part because sample size is dependent on many aspects, including the number of constructs measured, the number of items per construct, the relationships between items, and the clarity of these (Osborne et al., 2008). A smaller sample will tend to limit generalizability of results, which is an acceptable risk at this stage, as the study is exploratory and we expect to do further validation work. We had 35 apprentice and 36 practitioner respondents, for a total of 71 respondents across both groups for our 58-item survey. Given these sample size limitations, we chose to conduct a sequence of EFA models. We identified three items that cross-loaded and removed these.

To ascertain whether our data were appropriate for EFA, we conducted two tests: the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (Kaiser, 1974), which measures EFA sampling adequacy for each variable and also for the model as a whole; and Bartlett's test of sphericity (Bartlett, 1950), which determines whether correlations between variables are strong enough to use EFA. Across models, we found KMO Measures of Sampling Adequacy ranging from .79 to .84, which meet the recommendation of greater than or equal to .70 (Lloret et al., 2017). Barlett's test of sphericity was consistently statistically significant at $p < .001$ (Bartlett, 1950). Based on these results, we conducted EFA and also pursued regression modeling with variables created as average scores for the factors: persistence intentions, caregiver self-efficacy, healthcare professional self-efficacy, mentoring, healthcare professional identity and caregiver identity. We created average scores based on the reported frequency of traditional forms of RTI (lecture, reading, watching a video) and active learning (discussions, role play, solving problems). We also calculated a percent privileged score for each respondent, based on their membership in privileged sex/gender, race/ethnicity, and language demographic groups (a white or Asian, English-speaking man received a score of 100%; women, non-binary, and transgender respondents,

those who spoke languages other than English in their homes, and those from minoritized race and ethnicity groups (Black, Indigenous, Pacific Islander, Latiné) were counted as not privileged).

Results

Qualitative Analysis

Responses to open-ended questions provided context for understanding respondents' experiences and selections on close-ended items. Table 4.2 provides examples of rich qualitative data that deepened our understanding of the study constructs.

Table 4.2. Sample responses by apprentices (A) and FHCWs (F) on open-ended questions, organized by construct.

Construct	Sample responses
Caregiver self-efficacy *Think about any past experiences you have had providing care for family and friends. Have these experiences helped you feel more confident in your apprenticeship program?*	A: "I helped taking care of a person who had a wound. We don't have nursing home in our country. This encourages me to be in the health field." A: "When I entered my MA program I was confident in my abilities from caring for my sister in law. I knew CPR, I knew different symptoms to looks out for different health emergencies. I was confident in bedside manner." F: "I have a friend with MS and epileptic seizures who was nearly 400 lbs. I took care of her medically."

Caregiver identity *Have you had any specific past experiences providing care to family members or others that motivated you to enter your occupation?*	A: "Yes for a while I was the care provider for my grandmother. Also since I am fluent in English and Spanish, I have always had to help my family members who did not speak English, since I was a child, so I believe that experience has motivated me to help others." A: "My father. He was a cancer patient. So I become his nurse that experience motivate me to become nurse." F: "Yes so I always watch my mother being a big caretaker from family to work she took care many of our family members I always looked up to my mom she show me hard work and doing the best job I can makes all the difference and having compassion for what you do anyone can get job but it takes compassion and love to do good job at your career."
Healthcare self-efficacy *How has your self-confidence at work changed throughout your apprenticeship program?*	A: "In the beginning I was afraid to do anything on my own until I had checked with the nurse if it was the right thing to do. Now we joke I hardly ask him questions as I have become more confident in my job and know what to do in situations." A: "By being in clinic and having hands on experience, I feel like that has built my confidence and skill set."

	F: “I couldn’t express myself, but through talking with people I can express myself with no fear.”
Healthcare professional identity *How has your apprenticeship program helped you feel like you belong in the occupation you are apprenticing for?*	A: “I saved a life.” A: “Everyone is welcoming and patient and understanding especially when it comes to me coming with personal lived experience.” F: “I felt like I belonged because previously I was in home health care. [I] love taking care of people. I feel now I’m [in an] environment where I can do and do more.”
Learning Supports *What has helped you learn in your RTI classes?*	A: “Discussing things with my coworkers.” A: “The RTI helped me simulate real life situation.” A: “Patient care has helped me evolve through this process.” F: “Acting, reading, discussing topics, videos.”
Mentoring *What would you change about how your mentor works with you?*	A: “Nothing. Couldn’t ask for a better one mentor is excellent.” A: “Would want more of their time.” F: “I think the mentor itself should have at least a latest of training or a review of a new skills, because according to my mentor it’s been years that she has no idea anymore of the latest skills.”

Intent to persist	A: “Loss of daycare.”
What might keep/have kept from completing our apprenticeship program?	A: “Nothing I’m all in.”
	A: “I want to complete this program and then maybe move on to LPN or RN.”
	A: “The fear of not understanding the material.”
	F: “Perhaps if I had to pay for the program as opposed to working while training.”

One theme that emerged from qualitative analysis was that of *patient care as a calling*. There were strong, frequent assertions from apprentices and FHCWs alike that providing healthcare was not merely a vocation, but a destiny, something that they were born to do. As in interviews conducted in our prior research (Gallup & Svihla, 2024), apprentices and workers in this study referred frequently to humanitarian ideals of love and care for others in their responses:

- Empathy is part of my DNA.
- …Elsewhere previously [patients] fought their CNAs, [but] they embrace me as their CNA. I do not diminish their humanity.
- …Direct patient care is what I am destined to do.
- Warms my heart knowing I am helping someone.
- Caring for others is my calling.

These findings underline the vital role of caregiver self-efficacy and caregiver identity as constructs in any research on frontline healthcare apprentices and workers.

The qualitative analysis also helped us see that negative responses about the quality of the RA experience, the help of the mentor, and the value of the RTI courses were rare, a

fact that was also demonstrated by the quantitative analysis, but they were present. We identified the theme of *disrespect and poor mentorship* through the analysis of the complaints:

- I felt beaten down, belittle, undermine, and sabotage.
- …I felt used for the first 3 months to room patients since they saw the confidence and I was an MA before. I finally had to say, "I already know how to room patients, I need to learn the EMR." My mentor became angry with me.
- We never any kind of formal meeting [with my mentor]. Nor did anyone ever visit the clinic to see how I was an where I was in my program.
- Avoid yelling and impulsive behavior on the part of the mentor. Zero ethic.
- I wish they had placed me with someone who had baseline respect for me.
- The medical assistant program that I went through was very unfortunate because of the people that worked there at the time they were very unkind, and they broke my heart and my spirit.

This qualitative data, triangulated with that from early pilot testing during the development phases and compared with responses on quantitative items for the same construct, helped us make decisions about which items to retain and exclude in the final survey. For example, an open-ended question that asked about past experiences as a healthcare recipient garnered many responses that were similar or nearly identical to another open-ended question that asked about past experiences as a care provider for family and friends. Both items were designed to gather information about caregiver identity, and so we used this information to eliminate the first question in the final version of the survey. Through this analysis, we eliminated five open-ended questions in total and reduced the amount of time it takes to complete the survey.

Quantitative Analysis

Descriptive Statistics

Respondents answered 93% of all Likert questions. Table 4.3 displays the demographic characteristics of both sets of respondents (i.e., current apprentices and practitioners/former apprentices). The characteristics of our sample align well with previous research about the population of frontline healthcare providers. Tomer & Kane (2020) reported that frontline workers in all industries are more racially diverse and earn lower wages on average in comparison to all workers in the U.S. Over half (55%) of frontline healthcare providers are non-white (Blau et al., 2021). Women comprise about 75% of the overall healthcare workforce (Rabinowitz & Rabinowitz 2021), while FHCWs are predominantly women (86%). Frontline workers generally and FHCWs specifically tend to be less-educated compared to all U.S. workers (Blau et al., 2021); Tomer & Kane (2020) note that 47% have a high school diploma or less, while 18.2% of frontline workers have a bachelor's degree or higher. Finally, Blau et al. (2021) report that frontline healthcare workers are likely to be immigrants. While our survey did not collect immigration information from respondents, it is noteworthy that nearly 43% of apprentices and nearly 53% of practitioners speak a language other than English in the home. On average, respondents were 32% privileged (*SD* = 28%), suggesting that most belonged to two minoritized groups, making them intersectionally minoritized.

Table 4.3. Descriptive statistics for respondents, comparing current apprentices to practitioners

		Apprentices		Practitioners	
Characteristics		N	%	N	%
Gender	Women	30	85.7	31	86.1
	Men	3	8.6	5	13.9
	Non-binary/Trans	2	5.7	0	0
Race & Ethnicity	White	9	25.7	10	27.8
	Asian	3	8.6	1	2.8

	Latiné	9	25.7	13	36.1
	Black	14	40	10	27.8
	Pacific Islander	1	2.9	0	0
Age	16-30 years old	11	31.4	8	22.2
	31-45 years old	16	45.7	17	47.2
	46+ years old	7	20	11	30.6
Home Language	English only	20	57.1	17	47.2
	English + another language(s)	10	28.6	11	30.6
	Another language	5	14.3	8	22.2
Income	Low income	19	54.3	7	19.4
	Lower-middle income	7	20	7	19.4
	Middle income	8	22.9	16	44.4
	Upper-middle income	1	2.9	4	11.1
	High income	0	0	1	2.8
Education attainment					
	Some high school	1	2.9	0	0
	High school	7	20	5	13.9
	Some college	14	40	10	27.8
	Associate's degree	3	8.6	11	30.6
	Trade school degree or industry-recognized credential	5	14.3	0	0
	Bachelor's degree	3	8.6	5	13.9
	Master's degree	2	5.7	5	13.9
	Ph.D. or Medical Doctor	0	0	0	0

Seven (20%) of the current apprentices reported that they completed a pre-apprenticeship program. In terms of their RTI, 10 (28.6%) reported that a community college conducted the RTI. Most had completed six months or less of their apprenticeship program (20, 57.1%), with six (17.1%) reported having completed 7-11 months, three (8.6%) reporting having completed 1-1.5 years, and three (8.6%) reporting having nearly completed their program. We asked apprentices to report how frequently their RTI included traditional forms of instruction (lectures, reading, watching videos: $M = 5.31$; $SD = 1.43$) and more

active forms of instruction (discussing, role play, and problem solving: $M = 4.48$; $SD = 1.67$). Overall, they reported more frequent exposure to traditional forms of instructions (Figure 4.2). Interestingly, a few reported the absence of lectures, whereas others reported the absence of discussion and role-play.

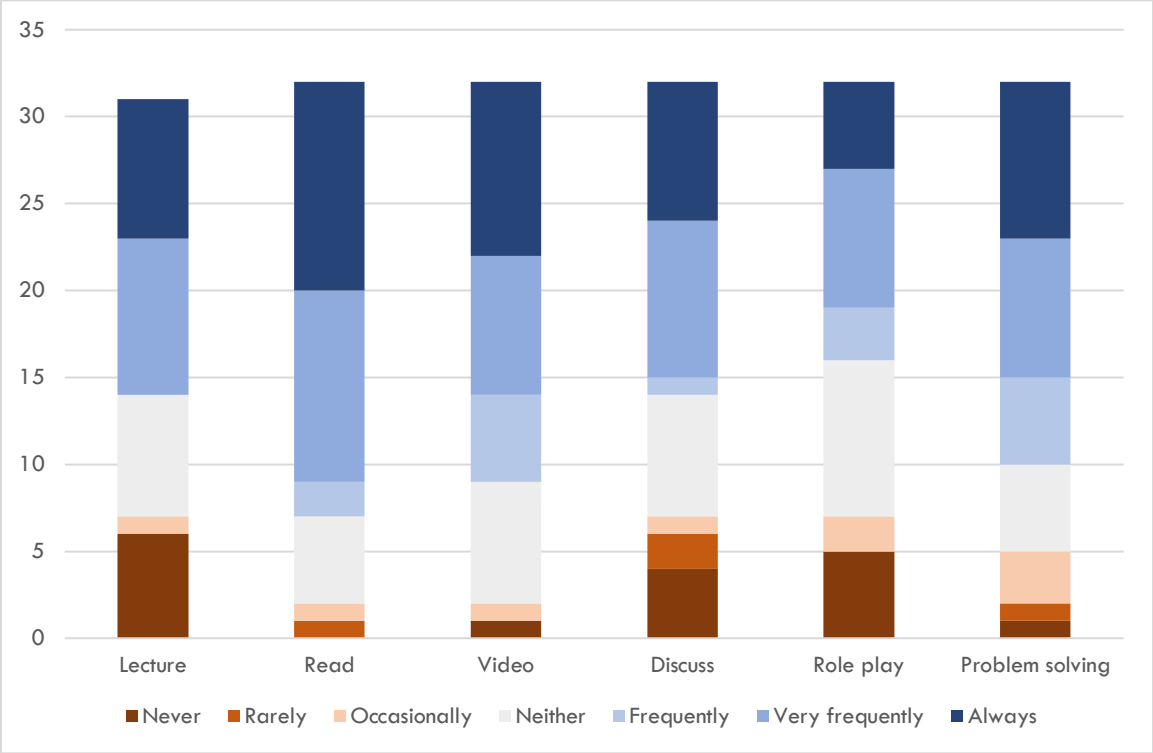


Figure 4.2. Reported frequency of traditional forms of instruction (lectures, reading, watching videos) and more active forms of instruction (discussing, role play, and problem solving).

We conducted selective t-tests but found no significant differences between apprentices and professionals on study constructs. This may be due to a relatively small sample size as well as somewhat higher variability amongst the professionals. We thus report the mean scores for study constructs across the entire sample or respondents (Figure 4.3). In addition, this supports our decision to use the full sample in EFA.

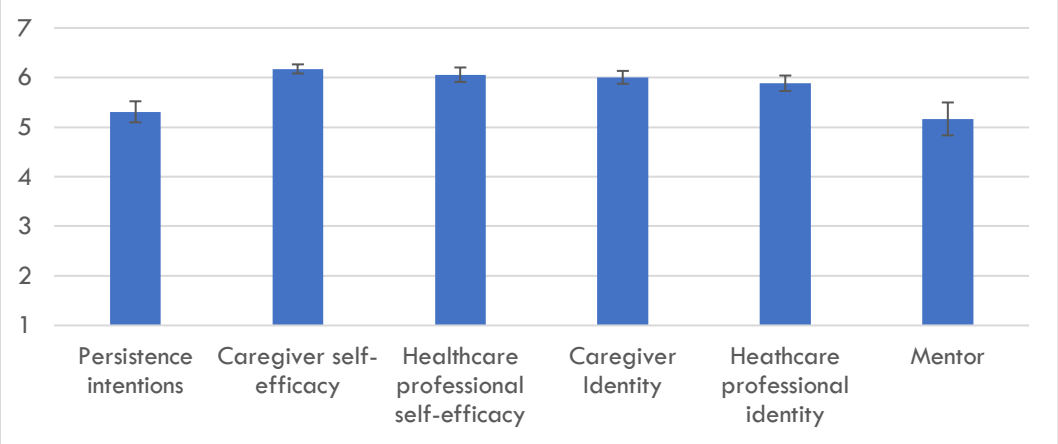


Figure 4.3. Mean scores on study constructs. Error bars are standard errors.

Exploratory Factor Analysis Results

In general, items clustered together into the same factors across models, providing conditional support for six factors (Tables 4.4 & 4.5). We report two EFA results that allowed us to determine whether caregiver and healthcare professional variants of self-efficacy and identity clustered separately. In the first model, we included items intended to measure persistence intentions, caregiver self-efficacy, healthcare professional self-efficacy, instrumental mentoring, and socioemotional mentoring (Table 4.4). We recovered four factors: persistence intentions, caregiver self-efficacy, healthcare professional self-efficacy, and mentoring. We did not find support for two factors related to mentoring, though we did find support for both caregiver self-efficacy and healthcare professional self-efficacy.

Table 4.4. Factor loadings from retained persistence, self-efficacy, and mentoring items.

Item prompt	*Factor Loading*				*Mean (SD)*	*α if deleted*
Factors:	1	2	3	4		

Factor 1: Persistence intentions ***(α = 0.67).*** Within the next 5 years, how certain or uncertain are you that you will be working:						
in that occupation?	0.67	-0.22	-0.04	-0.09	4.79 (2.12)	-
in any healthcare career?	0.77	0.19	0.11	0.06	5.82 (1.91)	-
Factor 2: Caregiver self-efficacy ***(α = 0.92)*** How confident or unconfident are you that you can:						
Provide appropriate care for another person.	-0.01	0.71	0.09	0.04	6.31 (0.82)	0.92
Solve difficult care problems?	-0.14	0.80	0.03	0.09	6.04 (0.91)	0.90
Deal well with unexpected events in the care of another person?	-0.05	0.89	-0.03	-0.11	6.15 (0.87)	0.88
Remain calm when facing stressful care difficulties?	0.17	0.85	-0.09	-0.04	6.19 (0.80)	0.89
Factor 3: Healthcare professional self-efficacy ***(α = 0.90)*** How confident or unconfident are you that you can:						
Help patients and families navigate the healthcare system?	-0.08	0.09	0.78	-0.03	5.67 (1.64)	0.91
Communicate effectively with patients and their families?	-0.11	-0.05	0.92	-0.07	6.12 (1.37)	0.85
Work well as part of a healthcare team?	0.20	-0.08	0.83	0.05	6.29 (1.15)	0.87
Maintain care in high-stress healthcare situations?	0.06	0.04	0.90	0.03	6.15 (1.17)	0.87
Factor 4: Mentoring ***(α = 0.99).*** How true or untrue is each statement below of your mentor in the apprenticeship program? My mentor...						
shows me respect.	-0.03	0.03	0.05	0.96	5.43 (2.71)	0.99
is understanding about the concerns and feelings I've discussed with them.	-0.05	0.03	0.03	0.98	5.24 (2.69)	0.98
encourages me in my work.	-0.05	0.06	0.05	0.99	5.29 (2.69)	0.99
helps me do assignments or prepare for tests that otherwise would have been difficult to complete on my own.	-0.05	-0.06	-0.01	0.90	4.92 (2.76)	0.99
shows me how to improve my job-related skills.	0.12	-0.04	-0.08	0.96	5.11 (2.71)	0.99
helps me solve problems.	0.12	-0.02	-0.08	0.97	5.13 (2.74)	0.99

speaks up for my needs and interests.	-0.08	-0.01	0.02	0.95	5.05 (2.76)	0.99

Next, we conducted EFA with all items intended to measure healthcare professional identity and caregiver identity (Table 4.5). We recovered two factors aligned with these constructs. We did not find support for two variants of each—being identified by others and positioning oneself. Instead, all items related to each form of identity clustered together.

Table 4.5. Factor loadings for retained identity items

Item prompt	*Factor Loading*		*Mean (SD)*	*α if deleted*
Factors:	1	2		
Factor 1: Healthcare professional identity ***(α = 0.94).*** How true or untrue are the following statements about you?				
I feel like I belong in that occupation.	0.56	0.08	5.64 (1.59)	0.95
Being a healthcare professional is an important part of who I am.	0.48	0.38	6.17 (1.25)	0.94
I have come to think of myself as a professional in that occupation.	0.93	-0.11	5.83 (1.50)	0.92
My family and friends see me as a professional in that occupation.	0.96	-0.01	5.9 (1.49)	0.91
My co-workers and peers see me as a professional in that occupation.	1.00	-0.02	5.86 (1.55)	0.91
My mentors and preceptors see me as a professional in that occupation.	0.98	0.00	5.91 (1.52)	0.91
Factor 2:Caregiver identity ***(α = 085.)*** How true or untrue are the following statements about you?				
Providing care to others is an important part of who I am.	0.04	0.72	6.43 (0.99)	0.84
Being a caregiver sets me apart from others.	-0.07	0.79	5.73 (1.50)	0.81
Friends and family members turn to me when they have health-related problems or concerns.	0.06	0.73	5.73 (1.44)	0.80
I have heard from others that I'm a natural caregiver.	-0.05	0.89	6.13 (1.23)	0.79

Regression Modeling

We conducted a sequence of regression models, first modeling persistence intentions as an outcome (Table 4.6) and then modeling healthcare identity (Table 4.7). In the first model, we found that healthcare identity significantly and positively predicted persistence intentions. This model explained significant variance in persistence intentions, $F(61, 2) = 7.72$, $p = .001$, $r^2 = .20$.

Table 4.6. Regression model of persistence intentions.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	*t*	*p*
constant	1.47	1.07		1.37	0.18
Healthcare self-efficacy	0.13	0.25	0.09	0.51	0.61
Healthcare professional identity	0.52	0.22	0.38	2.30	0.03

Next, we modeled healthcare professional identity, focusing on the experiences in the apprenticeship that might contribute to the formation of healthcare identity, including mentorship and RTI, as well as their underlying caregiver experiences. Due to concerns about collinearity, we conducted a series of models, finding similar results across models. Perhaps surprisingly, mentoring did not explain significant variance. In the second model, we found that caregiving self-efficacy and active learning in the RTI significantly and positively predicted healthcare professional identity. Traditional instruction was negatively associated with healthcare professional identity, but this was not significant. This model explained significant variance in healthcare professional identity, $F(25, 3) = 3.92$, $p = .02$, $r^2 = .32$.

Table 4.7. Regression model of healthcare professional identity.

	Unstandardized Coefficients	Standardized Coefficients	*t*	*p*

	B	Std. Error	Beta		
constant	1.64	1.45		1.13	0.27
RTI Traditional instruction	-0.28	0.21	-0.41	-1.33	0.20
RTI Active learning	0.37	0.18	0.61	2.10	0.05
Caregiving self-efficacy	0.66	0.25	0.48	2.64	0.01

We also explored models of healthcare professional self-efficacy. We found that on its own, caregiver identity positively and significantly predicted healthcare professional self-efficacy, $F(63, 1) = 33.78$, $p < .001$, $r^2 = .33$. Alternatively, we found that caregiving self-efficacy and active learning in the RTI significantly and positively predicted healthcare professional, while traditional instruction significantly and negatively did so, $F(25, 3) = 10.80$, $p < .001$, $r^2 = .51$. We summarize the relationships across models and constructs (Figure 4.4). Overall, traditional RTI instruction negatively predicted the formation of healthcare professional identity and self-efficacy, whereas active learning positively predicted these.

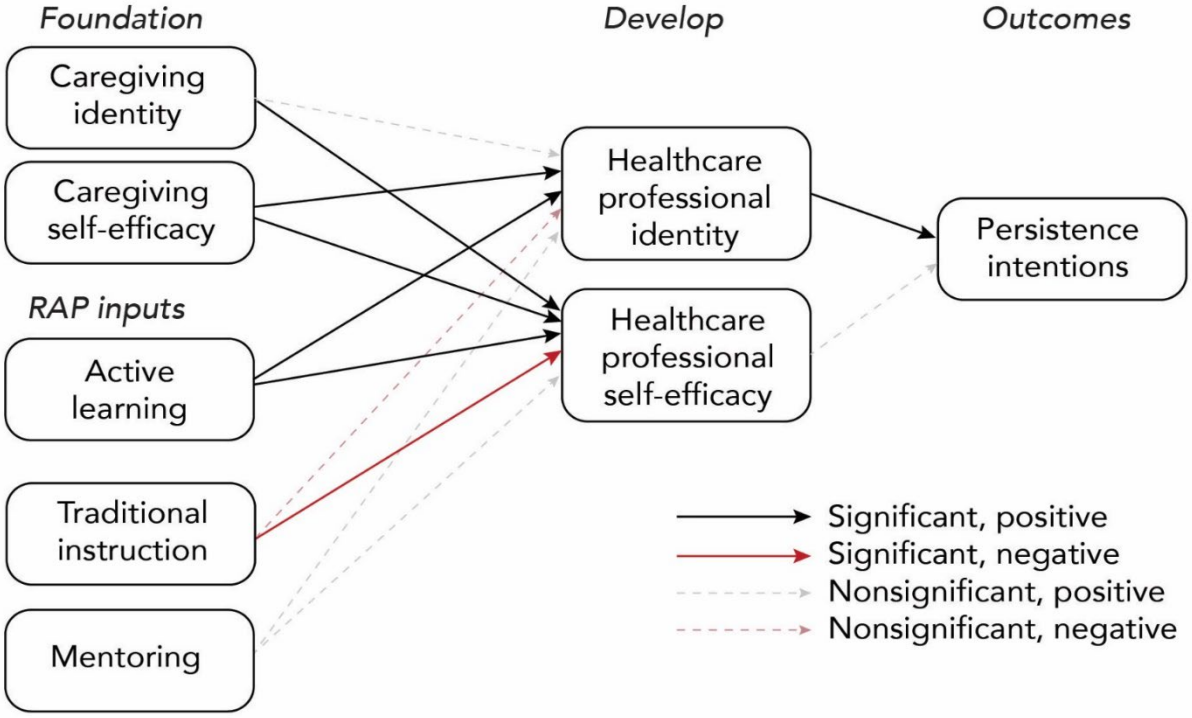


Figure 4.4. A summary model of relationships between study constructs, across models.

Discussion and Implications

We discuss our results organized by research question, sharing scholarly as well as practical implications.

Measuring Frontline Apprentices' Professional Identity, Self-efficacy, and Persistence Intentions

Our first research question asked to what extent STAE provides useful information about frontline apprentices' professional identity, self-efficacy, and persistence intentions. Using qualitative and quantitative analyses, we developed a refined version of the Survey of Transformative Apprenticeship Experiences (STAE) (Appendix D). It has 47 items, both Likert-scaled and constructed response, pertaining to caregiver self-efficacy, healthcare professional self-efficacy, caregiver identity, healthcare professional identity, and persistence intentions. In addition to initial framing and final demographic items, we also retained items pertaining to learning supports and mentoring, given their importance for the population.

Qualitative analyses of survey responses afforded a deeper understanding of the study constructs and showed that survey items measured what they were intended to measure. Our findings showed that frontline healthcare apprentices and FHCWs, the majority of whom had caregiving experiences in the past, largely described themselves as destined or uniquely suited to care for others. This outcome aligned closely with our previous research (Svihla & Gallup, 2024), reinforcing our decision to separate caregiver self-efficacy and identity from their healthcare professional counterparts and explaining the significant separation between these constructs that we identified with EFA. The salience of mentor and peer relationships in the qualitative analysis established the relationship between social support and persistence (Gray, 2019; Wu & Pooler, 2014; Zhao et al., 2023) and mentoring and persistence that have been described in the literature on adjacent contexts (Moss, 2022; Pham et al., 2014).

Having a research-based survey can contribute to narrowing gaps in understanding about apprentices and how RAP leaders can design programs to promote their development, supporting apprentices' persistence intentions. While research shows that self-efficacy and professional identity support persistence intentions in other contexts, the relative lack of research on workplace learning among low-wage workers and in RA generally (Gallup, 2024) is a gap in scholars' and practitioners' understanding of how these key characteristics develop among apprentices. It is consequential, given the worsening shortage of frontline healthcare workers in the United States, coupled with high attrition in these positions and in the RAPs designed to serve as on-ramps into these professions underline the need for greater understanding of what contributes to apprentices' persistence intentions. The STAE jointly provides nuanced information about individual apprentices' experiences, along with trends that contribute to more generalizable findings.

The STAE, as a measure of persistence intentions among frontline healthcare apprentices, provides a means to collect evidence of the relationships among self-efficacy, identity, and persistence in a lower prestige setting. While these relationships are well-studied in higher prestige settings, like nursing and medical education (Abusubhiah et al., 2023; Chiang et al., 2022; DeSimone et al., 2018; Hu et al., 2022; Zhang et al., 2021), fewer studies have investigated the relationships in lower prestige settings; exceptions include studies of hotel and restaurant staff (Jerez Jerez et al., 2023; Wang et al., 2020).

Most studies relating persistence to self-efficacy and identity in high prestige settings focus on role identity and self-efficacy related to the intended profession (Abusubhiah et al., 2023; Chiang et al., 2022; DeSimone et al., 2018; Hu et al., 2022; Zhang et al., 2021). In our approach, we also included foundational identity and self-efficacy related to care-giving, based on our prior research showing that frontline healthcare apprentices overwhelming cited such experiences as central to their decision to undertake and continue in an apprenticeship (Gallup & Svihla, 2024). Using EFA, we found a significant distinction between caregiver and healthcare professional variants of both self-efficacy and identity. This finding both

speaks to and extends current conceptualizations of caregiver identity and self-efficacy. While caregiver identity and change theory (Montgomery & Kosloski, 2009) characterizes the development of caregiver identity as stemming from dissonant and often painful role changes while caring for a loved one, our findings suggest this transformational change can contribute to the strength and success of the caregiver if they choose to pursue a professional healthcare role in the future. The separation of caregiver identity and self-efficacy from healthcare professional identity and self-efficacy furthers our understanding of the durability and salience of the caregiver identity among frontline healthcare workers. It might be assumed that a frontline healthcare provider's initial identity as a caregiver is overwritten, over time, by the healthcare professional identity. Our findings indicate this may not be the case and that research on the origins and behavior of related constructs, such as compassionate care, in healthcare professionals could be re-examined. In addition, a future study might investigate and compare the salience of caregiver identity among healthcare professionals in lower and higher prestige occupations.

Predicting Frontline Healthcare Apprentices' Persistence Intentions

Our second research question investigated the extent to which frontline healthcare apprentices' self-efficacy and identity predicted their persistence intentions. Using regression modeling, we found that caregiving self-efficacy and active learning in the RTI portion of the RAP predicted healthcare professional identity. Regression modeling further showed that healthcare professional identity positively predicted persistence intentions among apprentices. In other words, those workers who enter their RAP with existing self-confidence as a caregiver, developed through experiences providing care for family members and others, and who also have the opportunity to actively apply their learning through hands-on techniques during their RAP, may be more likely to develop a positive identity as a healthcare professional, a characteristic that promotes persistence in the RAP and in the notoriously tough and stressful frontline healthcare fields.

These outcomes align with a large body of educational research in other contexts, particularly nursing education research, that supports the use of role play, simulation, and other active learning techniques to engage learners in experiences that help them feel, think, and act like professionals (Abusubhiah et al., 2023; Chiang et al., 2022; Nørgaard et al., 2012). Research has associated nurses' professional identity development with improved performance and care as well as persistence intentions (Anderson et al., 2020; Andrews et al., 2011; Hu et al., 2022). While frontline healthcare RAPs share some characteristics with nursing education programs, there are likely meaningful differences between the learners and contexts that are associated with the structural and cultural power dynamics that influence participation within them (Collins & Bilge, 2020). Future research could further characterize the differences between these contexts, better describe the distinct strengths and needs of frontline apprentices, investigate which active learning strategies, programmatic elements, and designs for learning best contribute to healthcare professional development among frontline workers. Future research could also explore the likely relationship between caregiver identity and professional healthcare identity with a larger sample size.

As RA expands in the U.S., the model is changing in response to new contexts and constraints in nontraditional industries, such as healthcare. Shorter RAPs and other money- and time-saving modifications are facilitated by technology. Aligning with educational research in other contexts, our findings suggest that RA leaders seeking to solve the attrition problem and promote success among their apprentices may wish to design their programs to promote the development of self-efficacy and healthcare professional identity. In doing so, they may find that they want to more fully embrace some of the central elements of this time-tested model. Bandura (1997) identified several sources of self-efficacy, three of which map directly onto major components of traditional RAPs in the U.S. One source is experiences that help one develop a high level of proficiency and the ability to meet goals and achieve success despite difficulties. RAPs traditionally offer hands-on learning opportunities in both the RTI and the OJL. Many respondents mentioned hands-on learning, active learning as key to their RAP experience, which was reinforced by the results of our regression modeling.

According to Bandura, vicarious experiences of social models – or mentors – can also promote self-efficacy development. Numerous respondents noted the pivotal role of their mentor in their RAP, either positively or negatively. Bandura also identified a belief in one's own success and one's psychological state as influencing self-efficacy. The traditional RA model includes face-to-face learning with a cohort of peers; many respondents cited their peers', mentors' and patients' support as crucial to their success, a perception supported by research findings that emphasize the importance of social capital in persistence and success (Gray, 2019; Wu & Pooler, 2014; Zhao et al., 2023). The weight that respondents gave to wraparound supports strongly aligns with Rege et al.'s (2023) findings, as well as research among minoritized learners in community college settings, that centers the need for financial incentives, inclusive and flexible policies, and accommodation of learning differences for this population.

We hope that the survey will help RA leaders evaluate their effectiveness in promoting the development of self-efficacy and professional identity in their programs, facilitating apprentices' completion and success. Since research on registered apprenticeship has focused predominantly on economic outcomes, learning among apprentices – frontline or otherwise – has not received as much attention (Gallup, 2024). The literature suggests multiple reasons for and responses to attrition (Rege, et al., 2023), but we hope that the STAE will provide leaders with information on whether and how their own apprentices are developing the confidence and sense of belonging that has been shown to be impactful in adjacent learning contexts (Chow-Garcia, et al., 2022; Hernandez et al., 2017; Hu et al., 2022).

Limitations

The exploratory goals of our study justify the use of a nonprobability design. However, our use of a restricted convenience sample meant that there was a higher likelihood of sampling error, and we could not make meaningful statistical inferences about the larger

population of frontline healthcare apprentices (Dillman et al., 2016). Descriptive statistics showed that our sample's demographics aligned well with previous research on the demographics of frontline healthcare workers, but the design leaves open the possibility that respondents may not have been representative of the target population. Another limitation is that survey response rates were low due to our dependence upon RA sponsors and leaders to distribute the survey, the varying instructional schedules of the RAPs, and the challenges in accessing the small population of frontline apprentices in the United States. As such, the sample size for the full pilot test was small (n=71), included some FHCWs who were very similar but not identical to the target population, and the study was correlational in nature. A larger sample size for EFA would provide more trustworthy findings. Future research should include probability sampling of the population in order to further test and use confirmatory factor analysis to assess the structure. However, the challenge of contacting these apprentices, who are not listed in state or national registries, will likely remain for the foreseeable future. Another limitation of the study is that it employs a single mode of contact (through the instructor or RAP leader) and a single mode of response (the online survey). Mixed-mode approaches can improve response rates and reduce coverage, non-response, and measurement error (Dillman, et al., 2016). This study contributes to the development of a tool that can provide valuable information to both scholars and practitioners, but we recognize the need for more validation work with a larger probability sample of apprentices.

Conclusion

This study developed STAE, a new measure of frontline healthcare apprentices' experiences in RAPs and investigated the extent to which the STAE provides valid information about professional identity, self-efficacy, and persistence intentions. Using EFA, we found a significant distinction between caregiver and healthcare professional variants of both self-efficacy and identity. Using regression modeling, we further found that caregiving self-efficacy and active learning in the RTI portion of the RAP predicted healthcare professional identity. In turn, healthcare professional identity positively predicted persistence

intentions among apprentices. Using both the qualitative and quantitative results, we revised and shortened the survey to 47 items. Our results show that this survey provides useful information about the development of key characteristics in an understudied population and may be a useful tool for identification of those apprentices who already identify as caregivers and those who may be more likely to need intervention in order to succeed. In addition, these findings provide support for the utilization of active learning approaches such as role play and collaborative problem-solving in lieu of the emphasis on lectures and decontextualized testing approaches that are commonly found in traditional RAPs. Future research can further investigate the active learning approaches that best support frontline apprentices to thrive within their RAPs.

References

Abusubhiah, M., Walshe, N., Creedon, R., Noonan, B., & Hegarty, J. (2023). Self-efficacy in the context of nursing education and transition to practice as a registered practitioner: A systematic review. *Nursing Open*, *10*(10), 6650-6667. https://doi.org/10.1002/nop2.1931

Ambuehl, B., & Inauen, J. (2022). Contextualized measurement scale adaptation: A 4-step tutorial for health psychology research. *International Journal of Environmental Research and Public Health, 19*, 12775. https://doi.org/10.3390/ijerph191912775

Amoyaw, M., & Brown, D. (2018). *Apprenticeship America: An idea to reinvent postsecondary skills for the digital age*. Third Way.

Anderson H., Birks Y., & Adamson, J. (2020). Exploring the relationship between nursing identity and advanced nursing practice: An ethnographic study. *Journal of Clinical Nursing, 29*, 1195–1208. https://doi.org/10.1111/jocn.15155

Andrews, D.R., Burr, J., & Bushy, A. (2011). Nurses' self-concept and perceived quality of care: A narrative analysis. *Journal of Nursing Care Quality, 26*(1), 69–77. https://doi.org/10.1097/ncq.0b013e3181e6f3b9

Bartlett, M.S. (1950). Tests of significance in factor analysis. *British Journal of Statistical Psychology, 3*(2), 77-85. https://doi.org/10.1111/j.2044-8317.1950.tb00285.x

Bergson-Shilcock, A. (2017). *Foundational skills in the service sector: Understanding and addressing the impact of limited math, reading, and technology proficiency on workers and employers*. National Skills Coalition.

Biemer, P. P., & Lyberg, L. E. (2003). *Introduction to survey quality*. John Wiley & Sons.

Bilginsoy, C. (2018). Unemployment, the Great Recession, and apprenticeship attrition in the U.S. *Journal of Vocational Education & Training*, *70*(2), 171-192. https://doi.org/10.1080/13636820.2017.1392999

Blau, P. (2017). *Exchange and power in social life*. Routledge. https://doi.org/10.4324/9780203792643

Blau, F. D., Koebe, J., & Meyerhofer, P. A. (2021). Who are the essential and frontline workers? *Business Economics*, *56*, 168-178. https://dx.doi.org/10.1057/s11369-021-00230-7

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Frontiers in Public Health*, *6*, 149. https://doi.org/10.3389/fpubh.2018.00149

Brawner, C. E., Felder, R. M., Allen, R., & Brent, R. (2002). A survey of faculty teaching practices and involvement in faculty development activities. *Journal of Engineering Education, 91*(4), 393-396. https://doi.org/10.1002/j.2168-9830.2002.tb00722.x

Brandon, P. R., Young, D. B., Pottenger, F. M., & Taum, A. K. (2009). The inquiry science implementation scale: Development and applications. *International Journal of Science and Mathematics Education*, *7*(6), 1135-1147. https://doi.org/10.1007/s10763-009-9156-0

Chemers, M. M., Zurbriggen, E. L., Syed, M., Goza, B. K., & Bearman, S. (2011). The role of efficacy and identity in science career commitment among underrepresented minority students. *Journal of Social Issues, 67*(3), 469-491. https://doi.org/10.1111/j.1540-4560.2011.01710.x

Chiang, D. H., Huang, C. C., Cheng, S. C., Cheng, J. C., Wu, C. H., Huang, S. S., ... & Lee, F. Y. (2022). Immersive virtual reality (VR) training increases the self-efficacy of in-hospital healthcare providers and patient families regarding tracheostomy-related knowledge and care skills: A prospective pre–post study. *Medicine*, *101*(2). https://doi.org/10.1097/md.0000000000028570

Choi, E., & Yu, S. (2022). Effects of preceptors' mentoring function on novice nurses' self-efficacy and organizational commitment: A cross-sectional study. *Nurse Education in Practice*, *64*, . https://doi.org/10.1016/j.nepr.2022.103431

Chow-Garcia, N., Lee, N., Svihla, V., Sohn, C., Willie, S., Holsti, M., & Wandinger-Ness, A. (2022). Cultural identity central to Native American persistence in science. *Cultural Studies of Science Education. 17*(2), 557-588. https://doi.org/10.1007%2Fs11422-021-10071-7

Collins, P. H., & Bilge, S. (2020). *Intersectionality*. John Wiley & Sons.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 15*(3), 297-334. https://doi.org/10.1007/BF02310555

Cruess, R. L., Cruess, S. R., Boudreau, J. D., Snell, L., & Steinert, Y. (2014). Reframing medical education to support professional identity formation. *Academic Medicine*, *89*(11), 1446-1451. https://doi.org/10.1097/acm.0000000000000427

Davidson, W. B., Beck, H. P., & Milligan, M. (2009). The college persistence questionnaire: Development and validation of an instrument that predicts student attrition. *Journal of College Student Development, 50*(4), 373-390. https://doi.org/10.1353/csd.0.0079

Davis, L. L. (1992). Instrument review: Getting the most from a panel of experts. *Applied Nursing Research*, *5*(4), 194-197. https://doi.org/10.1016/S0897-1897(05)80008-4

Derse, J., & Bateman, T. (2021). *U.S. healthcare labor shortages compounded as a result of the pandemic.* Mercer. https://www.mercer.com/en-us/insights/us-health-news/us-healthcare-labor-shortages-compounded-as-a-result-of-the-pandemic/

De Vaus, D. (2013). *Surveys in social research*. Routledge. https://doi.org/10.4324/9780203519196

DeVellis, R.F. (2016). *Scale development: Theory and applications*. Sage.

De Simone, S., Planta, A., & Cicotto, G. (2018). The role of job satisfaction, work engagement, self-efficacy and agentic capacities on nurses' turnover intention and patient satisfaction. *Applied Nursing Research*, *39*, 130-140. https://doi.org/10.1016/j.apnr.2017.11.004

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2016). *Internet, phone, mail and mixed-mode surveys: The tailored design method*. Wiley.

Durham, M. F., Knight, J. K., & Couch, B. A. (2017). Measurement Instrument for Scientific Teaching (MIST): A tool to measure the frequencies of research-based teaching practices in undergraduate science courses. *CBE—Life Sciences Education*, *16*(4), ar67. https://doi.org/10.1187/cbe.17-02-0033

Echohawk, S., Ondrechen, M. J., Megginson, R., Cornelius, C., & McClanahan, M. (2014). Lighting the Pathway to Faculty Careers for Natives in STEM. Retrieved from https://www.nsf.gov/awardsearch/showAward?AWD_ID=1444853

Eifert, E. K., Adams, R., Dudley, W., & Perko, M. (2015). Family caregiver identity: A literature review. *American Journal of Health Education*, *46*(6), 357-367.

Estrada, M., Woodcock, A., Hernandez, P. R., & Schultz, P. W. (2011). Toward a model of social influence that explains minority student integration into the scientific community. *Journal of Educational Psychology, 103*(1), 206-222. https://doi.org/10.1037/a0020743

Fernandez, T., Godwin, A., Doyle, J., Verdin, D., Boone, H., Kirn, A., Benson, L., & Potvin, G. (2016). More comprehensive and inclusive approaches to demographic data

collection. *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*. https://peer.asee.org/25751

Fuller, J., & Raman, M. (2023, May-June). *The high cost of neglecting low-wage workers*. Harvard Business Review. https://hbr.org/2023/05/the-high-cost-of-neglecting-low-wage-workers

Gallup, A. (2024). What We Know About registered apprenticeship: A systematic review and synthesis of 30 years of empirical research. *Economic Development Quarterly*, *38*(1), 25-39. https://doi.org/10.1177/08912424231196792

Gallup, A., & Svihla, V. (2024). *Promoting success among frontline healthcare apprentices*. Manuscript submitted for publication.

Gibbons, C. (2010). Stress, coping and burn-out in nursing students. International Journal of Nursing Studies, 47, 1299-1309. doi:10.1016/j.ijnurstu.2010.02.015

Gray, C. M. (2019). Using profiles of human and social capital to understand adult immigrants' education needs: A latent class approach. *Adult Education Quarterly*, *69*(1), 3-23. https://doi.org/10.1177/0741713618802271

Hart, P. L., Brannan, J. D., & De Chesnay, M. (2014). Resilience in nurses: An integrative review. *Journal of nursing management*, *22*(6), 720-734. https://doi.org/10.1111/j.1365-2834.2012.01485.x

Hanauer, D. I., Graham, M. J., & Hatfull, G. F. (2016). A measure of college student persistence in the sciences (PITS). *CBE-Life Sciences Education, 15*(4), 59–82. https://doi.org/10.1187/cbe.15-09-0185

Harkness, J. A., Villar, A., & Edwards, B. (2010). Translation, adaptation, and design. In J. A. Harkness, M. Braun, B. Edwards, T. P. Johnson, L. Lyberg, P. P. Mohler, B.-E. Pennell, & T. W. Smith (Eds.), *Survey methods in multinational, multiregional, and multicultural contexts* (pp. 115-140). Wiley. https://doi.org/10.1002/9780470609927.ch7

Healthcare Career Advancement Program. (2017). *A toolkit for registered apprenticeship in healthcare*. https://www.hcapinc.org/registered-apprenticeship-toolkit

Hernandez, P. R., Bloodhart, B., Barnes, R. T., Adams, A. S., Clinton, S. M., Pollack, I., Godfrey, E., Burt, M., & Fischer, E. V. (2017). Promoting professional identity, motivation, and persistence: Benefits of an informal mentoring program for female undergraduate students. *PloS One*, *12*(11). https://doi.org/10.1371/journal.pone.0187531

Holland, D., Lachicotte, W., Skinner, D., & Cain, C. (1998). *Agency and identity in cultural worlds*. Harvard.

Hovey, C. L., Barker, L., & Luebs, M. (2019). Frequency of instructor- and student-centered teaching practices in introductory CS courses. *Proceedings of the 50th ACM Technical Symposium on Computer Science Education*, 599-605. https://doi.org/10.1145/3287324.3287363

Hsu, H.-Y., Li, Y., Dugger, S., & Jones, J. (2021). Exploring the relationship between student-perceived faculty encouragement, self-efficacy, and intent to persist in engineering programs. *European Journal of Engineering Education, 46*(5), 718-734. https://doi.org/10.1080/03043797.2021.1889469

Hu, H., Wang, C., Lan, Y., & Wu, X. (2022). Nurses' turnover intention, hope and career identity: The mediating role of job satisfaction. *BMC nursing*, *21*(1), 1-11. https://doi.org/10.1186/s12912-022-00821-5

Hypolite, L. I., Kitchen, J. A., & Kezar, A. (2022). Developing major and career self-efficacy among at-promise students: The role of a comprehensive college transition program. *Journal of College Student Retention: Research, Theory & Practice*, 15210251221138933. https://doi.org/10.1177/15210251221138933

Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education, 25*(1), 15-28. https://doi.org/10.4324/9781315620565-8

Jang, C. S., Choi, J., Maulik, R., & Lim, D. H. (2023). Determinants of adult education and training participation in the United States: A machine learning approach. *Adult Education Quarterly*, *73*(4), 382-401. https://doi.org/10.1177/07417136231198046

Jerez Jerez, M. J., Melewar, T. C., & Foroudi, P. (2023). The effect of waiters' occupational identity on employee turnover within the context of Michelin-starred restaurants. *Journal of Hospitality & Tourism Research*, *47*(7), 1215-1243. https://doi.org/10.1177/10963480211034903

Jnah, A. J., & Robinson, C. B. (2015). Mentoring and self-efficacy: Implications for the neonatal nurse practitioner workforce. *Advances in Neonatal Care*, *15*(5), E3-E11. https://doi.org/10.1097/anc.0000000000000227

Johnson, S. R. (2022, July 28). *Staff shortages choking U.S. health care system*. U.S. News & World Report. https://www.usnews.com/news/health-news/articles/2022-07-28/staff-shortages-choking-u-s-health-care-system

Jones, J., Hertel-Fernandez, A., & DeCarlo, C. (2021, November 4). *Equity snapshot: Apprenticeships in America.* U.S. Department of Labor Blog. https://blog.dol.gov/2021/11/03/equity-snapshot-apprenticeships-in-america

Kaiser, M. (1974). Kaiser-Meyer-Olkin measure for identity correlation matrix. *Journal of the Royal Statistical Society*, *52*(1), 296-298.

Kezar, A., Hypolite, L. & Kitchen, J. (2019). Career self-efficacy: A mixed-methods study of an unexplored research area for first-generation, low-income, and underrepresented college students in a comprehensive college transition program. *American Behavioural Scientist, 64*(3), 298-324. https://doi.org/10.1177/0002764219869409

Kezar, A., Kitchen, J., Estes, H, Hallett, R. & Perez, R. (2020). Tailoring programs to best support low-income, first-generation, and racially minoritized college student success. *Journal of College Student Retention, 25*(1), 1-27. https://doi.org/10.1177/1521025120971580

Kuehn, D. (2019). Registered apprenticeship and career advancement for low-wage service workers. *Economic Development Quarterly*, *33*(2), 134-150. https://doi.org/10.1177/0891242419838605

Landrum, R. E., Viskupic, K., Shadle, S. E., & Bullock, D. (2017). Assessing the STEM landscape: The current instructional climate survey and the evidence-based

instructional practices adoption scale. *International Journal of STEM Education*, *4*(1), 1-10. https://doi.org/ 10.1186/s40594-017-0092-1

Lasch, K. E., Marquis, P., Vigneux, M., Abetz, L., Arnould, B., Bayliss, M., ... & Rosa, K. (2010). PRO development: Rigorous qualitative research as the crucial foundation. *Quality of Life Research*, *19*(8), 1087-1096. https://doi.org/10.1007/s11136-010-9677-6

Lee, H., Lim, Y., Jung, H.Y., & Shin, Y.W. (2012). Turnover intention of graduate nurses in South Korea. *Japan Journal of Nursing Science, 9*(1), 63–75. http://dx.doi.org/10.1111/j.1742-7924.2011.00187.x.

Lloret, S., Ferreres, A., Hernández, A., & Tomás, I. (2017). The exploratory factor analysis of items: Guided analysis based on empirical data and software. *Anales de psicología*, *33*(2), 417-432. https://revistas.um.es/analesps/article/download/analesps.33.2.270211/210801/0

Lloyd, C., & Mayhew, K. (2010). Skill: The solution to low wage work? *Industrial Relations Journal, 41*(5), 429-445. https://doi.org/10.1111/j.1468-2338.2010.00578.x

Linos, E., Ruffini, K., & Wilcoxen, S. (2022). Reducing burnout and resignations among frontline workers: A field experiment. *Journal of Public Administration Research and Theory*, *32*(3), 473-488. https://doi.org/10.2139/ssrn.3846860

Lipscomb, S. T., Chandler, K. D., Abshire, C., Jaramillo, J., & Kothari, B. (2022). Early childhood teachers' self-efficacy and professional support predict work engagement. *Early Childhood Education Journal*, *50*(4), 675-685. https://doi.org/10.1007/s10643-021-01182-5

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382-386. https://doi.org/10.1097/00006199-198611000-00017

McCoach, D.B., Gable, R.K., & Madura, J.P. (2013). Instrument development in the affective domain. *Social and Corporate Applications*. Springer. https://doi.org/10.1007/978-1-4614-7135-6

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Messerotti, A., Banchelli, F., Ferrari, S., Barbieri, E., Bettelli, F., Bandieri, E., Giusti, D., Catellani, H., Borelli, E., Colaci, E., Pioli, V., Morselli, M., Forghieri, F., Galeazzi, G. M., Marasca, R., Bigi, S., D'Amico, R., Efficace, F., ... & Potenza, L. (2020). Investigating the association between physicians self-efficacy regarding communication skills and risk of "burnout". *Health and quality of life outcomes*, *18*, 1-12. https://doi.org/10.1186/s12955-020-01504-y

Montgomery, R., & Kosloski, K. (2009). Caregiving as a process of changing identity: Implications for caregiver support. *Generations*, *33*(1), 47-52. https://doi.org/10.1007/978-1-4614-5553-0_8

Moss, C. R. (2022). Examining job satisfaction and intent to stay for neonatal nurse practitioners: The impact of mentoring. *Advances in Neonatal Care*, *22*(4), 341-351. https://doi.org/10.1097/anc.0000000000000931

Musabwasoni, M. G. S., Kerr, M., Babenko-Mould, Y., Nzayirambaho, M., & Ngabonzima, A. (2020). Assessing the impact of mentorship on nurses' and midwives' knowledge and self-efficacy in managing postpartum hemorrhage. *International Journal of Nursing Education Scholarship*, *17*(1). https://doi.org/10.1515/ijnes-2020-0010

Myran, S. P., & Sylvester, P. J. (2021). Community college workforce development and student self-efficacy. *Community College Journal of Research and Practice*, *45*(8), 590-607. https://doi.org/10.1080/10668926.2020.1738288

Nørgaard, B., Ammentorp, J., Ohm Kyvik, K., & Kofoed, P. E. (2012). Communication skills training increases self-efficacy of health care professionals. *Journal of Continuing Education in the health professions*, *32*(2), 90-970. https://doi.org/10.1515/ijnes-2020-0010

Novilla, M. L. B., Moxley, V. B., Hanson, C. L., Redelfs, A. H., Glenn, J., Donoso Naranjo, P. G., Smith, J. M. S., Novilla, L.K.B., Stone, S., & Lafitaga, R. (2023). COVID-19 and psychosocial well-being: Did COVID-19 worsen U.S. frontline healthcare

workers' burnout, anxiety, and depression? *International Journal of Environmental Research and Public Health*, *20*(5), 4414. https://doi.org/10.3390/ijerph20054414

O'Muircheartaigh, C. A., Krosnick, J. A., & Helic, A. (2001). *Middle alternatives, acquiescence, and the quality of questionnaire data*. Irving B. Harris Graduate School of Public Policy Studies, University of Chicago.

Osborne, J. W., Costello, A. B., & Kellow, J. T. (2008). Best practices in exploratory factor analysis. *Practical Assessment, Research, and Evaluation*, *10*(7), 1-9. https://doi.org/10.7275/hb2g-m060

Patel, K., Nadel, J., & West, M. (2014). Redesigning the care team: The critical role of frontline workers and models for success. *Engelberg Center for Health Care Reform at Brookings*.

Pham, T. T. L., Teng, C. I., Friesner, D., Li, K., Wu, W. E., Liao, Y. N., ... & Chu, T. L. (2019). The impact of mentor–mentee rapport on nurses' professional turnover intention: Perspectives of social capital theory and social cognitive career theory. *Journal of Clinical Nursing*, *28*(13-14), 2669-2680. https://doi.org/10.1111/jocn.14858

Rabinowitz, L. G., & Rabinowitz, D. G. (2021). Women on the frontline: A changed workforce and the fight against COVID-19. *Academic Medicine*, *96*(6), 808. https://doi.org/10.1097/acm.0000000000004011

Rege, G., Curnow, C., & Campbell, C. (2023). *Improving apprenticeship completion rates*. American Institutes of Research.

Robnett, R. D., Chemers, M. M., & Zurbriggen, E. L. (2015). Longitudinal associations among undergraduates' research experience, self-efficacy, and identity. *Journal of Research in Science Teaching, 52*(6), 847-867. https://doi.org/10.1002/tea.21223

Ruel, E. E., Wagner III, W. E., & Gillespie, B. J. (2015). *The practice of survey research*. Sage.

Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio*. *Causal and control beliefs* (pp. 35-37). NFER-Nelson.

Siebert, D. C., & Siebert, C. F. (2005). The caregiver role identity scale: A validation study. *Research on Social Work Practice*, *15*(3), 204-212. https://doi.org/10.1177/1049731504272779

Sireci, S. G. (1998). The construct of content validity. *Social Indicators Research*, *45,* 83-117. https://doi.org/10.1023/A:1006985528729

Snyder, C. R., Frogner, B. K., & Skillman, S. M. (2018). Facilitating racial and ethnic diversity in the health workforce. *Journal of Allied Health*, *47*(1), 58-69.

Steffen, A. M., McKibbin, C., Zeiss, A. M., Gallagher-Thompson, D., & Bandura, A. (2002). The revised scale for caregiving self-efficacy: Reliability and validity studies. *The Journals of Gerontology Series B: Psychological sciences and social sciences*, *57*(1), 74-86. https://doi.org/10.1093/geronb/57.1.p74

Svihla, V., & Gallup, A. (2021). Do loss aversion and the ownership effect bias content validation procedures? *Practical Assessment, Research, and Evaluation*, *26*(7), 1-12. https://doi.org/10.7275/34d8-qe13

Tashakkori, A., & Teddlie, C. (Eds.). (2010). *Sage Handbook of mixed methods in social & behavioral research*. Sage Publications.

Tenenbaum, H. R., Crosby, F. J., & Gliner, M. D. (2001). Mentoring relationships in graduate school. *Journal of Vocational Behavior*, *59*(3), 326-341. https://doi.org/10.1006/jvbe.2001.1804

Tomer, A., & Kane, J.W. (2020). *To protect frontline workers before and after COVID-19, we must define who they are*. Brookings Institution.

Vardaman, J. M., Rogers, B. L., & Marler, L. E. (2020). Retaining nurses in a changing health care environment: The role of job embeddedness and self-efficacy. *Health care management review*, *45*(1), 52-59. https://doi.org/10.1097/hmr.0000000000000202

Venskus, D. G., & Craig, J. A. (2017). Development and validation of a self-efficacy scale for clinical reasoning in physical therapists. *Journal of Physical Therapy Education*, *31*(1), 14-20. https://doi.org/10.1097/00001416-201731010-00005

Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine, 8,* 1-13. https://doi.org/10.33151/ajp.8.3.93

Walter, E. M., Henderson, C. R., Beach, A. L., & Williams, C. T. (2016). Introducing the Postsecondary Instructional Practices Survey (PIPS): A concise, interdisciplinary, and easy-to-score survey. *CBE—Life Sciences Education*, *15*(4), ar53. https://doi.org/10.1187/cbe.15-09-0193. https://doi.org/10.1016/j.jhtm.2020.07.002

Wang, C., Xu, J., Zhang, T. C., & Li, Q. M. (2020). Effects of professional identity on turnover intention in China's hotel employees: The mediating role of employee engagement and job satisfaction. *Journal of Hospitality and Tourism Management*, *45*, 10-22. https://doi.org/10.1016/j.jhtm.2020.07.002

Wang, L., Tao, H., Bowers, B. J., Brown, R., & Zhang, Y. (2018). Influence of social support and self-efficacy on resilience of early career registered nurses. *Western Journal of Nursing Research*, *40*(5), 648-664. https://doi.org/10.1177/0193945916685712

Wu, C., & Pooler, D. (2014). Social workers' caregiver identity and distress: Examining the moderating role of self-esteem and social support. *Social Work Research*, *38*(4), 237-249. https://doi.org/10.1093/swr/svu024

Yamashita, T., Cummins, P. A., Millar, R. J., Sahoo, S., & Smith, T. J. (2019). Associations between motivation to learn, basic skills, and adult education and training participation among older adults in the USA. *International Journal of Lifelong Education*, *38*(5), 538-552. https://doi.org/10.1080/02601370.2019.1666927

Zhang, T., Feng, J., Jiang, H., Shen, X., Pu, B., & Gan, Y. (2021). Association of professional identity, job satisfaction and burnout with turnover intention among general practitioners in China: evidence from a national survey. *BMC Health Services Research*, *21*, 1-11. https://doi.org/10.1186/s12913-021-06322-6

Zhao, Z. H., Guo, J. Y., Zhou, J., Qiao, J., Yue, S. W., Ouyang, Y. Q., Redding, S. R., Wang, R., & Cai, Z. X. (2023). Perceived social support and professional identity in nursing students during the COVID-19 pandemic era: the mediating effects of self-efficacy and the moderating role of anxiety. *BMC Medical Education*, *23*(1), 117. https://doi.org/10.1186/s12909-022-03968-6

CONCLUSION

Registered apprenticeship (RA) is undergoing a renaissance in the United States. Driven by significant government investment (U.S. Department of Labor, 2023a), current or projected worker shortages in key industries (Grundy, 2023; Sablik, 2022; Schmitt & deCourcey, 2022) and the concomitant need for affordable, scalable, and effective workforce training, RA is expanding from the more traditional building trades to a diverse range of industries that includes education, hospitality, transportation, information technology, and healthcare. While participation is still low relative to participation in higher education and certainly in comparison to countries like Germany and Canada (McSwigan, 2023), it has grown significantly in the last decade, with a 64% increase in new apprentices since 2012 and more than 14,700 new RA programs (RAPs) created in the last five years (U.S. Department of Labor, 2023b). Practitioners and policymakers recognize RA as a venerable model of workforce development, while research has demonstrated impressive benefits for apprentices, employers, and society (Butrica et al. 2023).

However, there are gaps in scholarly research on RA that may hinder the full realization of these benefits in new contexts. As the RA model expands into nontraditional industries, it necessarily changes in response to novel constraints. Without an understanding of what and how program design elements have contributed to apprentices' learning, development, persistence, and success, program sponsors and developers may inadvertently make changes that threaten the strength of the model. Also lacking is scholarly research that explores the experiences and needs of the understudied learner populations that largely comprise in-demand and challenging frontline healthcare occupations, where some of the fastest growth in RA is taking place (U.S. Department of Labor, 2023b). In this dissertation, three interrelated studies sought to characterize and address some of these research gaps.

The first study was a systematic review of empirical research (n=134) on RA published over a 30-year period and a qualitative synthesis of their findings. The analysis yielded three

themes: expansion, benefits, and outcomes for minoritized groups. In addition to synthesizing research on the increase and diversification in RA over time and the advantages of the model for various stakeholders, the study summarized the better outcomes for apprentices in RAPs sponsored jointly by labor unions and employers than for those in non-joint RAPs. The study also found that though women and other minoritized groups are still poorly represented in traditional building trades RAPs (though they have better outcomes in joint programs), newer RAPs in frontline service and education occupations are much more successful in recruiting and retaining women of color. The analysis also yielded gaps in the literature. Scholarly research that identifies programmatic features contributing to apprentice retention, completion, and attainment of higher exit wages is scarce. Similarly, the synthesized research findings do not provide conclusive information about what promotes or inhibits learning and skill development in RA, though they do suggest compelling directions for future investigation. The paper concludes with a recommendation to investigate how learning and identity development play out in RA, particularly among apprentices in frontline service occupations, through the lens of social learning theories.

The second paper in this dissertation sought to address that recommendation with a qualitative exploration of the experiences of frontline healthcare apprentices, guided by the theories of legitimate peripheral participation (Lave & Wenger, 1998) and communities of practice (Wenger, 1998). This paper reported on a multiple case study based on interviews (n=17) with frontline healthcare apprentices and RAP leaders. We chose frontline healthcare (e.g., nursing assistants, medical assistants, homecare providers, community health workers, etc.) because, as the COVID-19 pandemic demonstrated to the nation, these workers do essential, stressful, and often lower-wage work, with resultant high attrition (Derse & Bateman, 2021; Linos & Ruffini, 2021). RA, with its economic and learning supports, is a model that may be uniquely suited to the needs of this key worker-learner population, whose characteristics, opportunities, and life experiences differ from those of workers in higher-prestige occupations. Our qualitative analysis resulted in 3 composite cases that described a developmental trajectory of professional identity and self-efficacy, two characteristics that

prior educational research has shown to be key to an adult learner's intention to persist in a job or training program. As apprentices moved along their trajectories, they expressed self-doubt or difficulty as they shifted from their roles as caregivers to roles and identities as professional healthcare providers. We found that transformative caregiving or care-receiving experiences; beliefs about one's calling as a caregiver; the support of a mentor and a cohort of peers in overcoming barriers; and hands-on opportunities to practice skills all contributed to the development of self-efficacy and persistence intentions, which promoted over time the development of a durable identity as a frontline healthcare professional. We also learned that wraparound supports designed to address the barriers this apprentice population faced were crucial prerequisites to their participation.

The third paper in this dissertation reported on a study that built upon these findings, as well as upon a review of the literature and existing validated surveys related to our constructs. We used survey development methodology to design, pre-test, and pilot a survey that measures professional identity, self-efficacy, and persistence intentions among frontline healthcare apprentices. We reduced an initial bank of survey items with the help of expert review (n=5). Pre-testing these items with individuals in adjacent populations (n=10) led to another revision, followed by a pilot of the online survey with current and previous frontline healthcare apprentices and frontline healthcare workers (n=71). Revision based on this pilot led to the development of a 47-item validation-ready survey. Using EFA, we found a significant distinction between caregiver and healthcare professional variants of both self-efficacy and identity. Using regression modeling, we further found that caregiving self-efficacy and active learning in the RTI portion of the RAP predicted healthcare professional identity. Regression modeling also showed that healthcare professional identity positively predicted persistence intentions among apprentices. Though it should be further evaluated with a larger sample size, the resultant tool can be used to help scholars learn more about the development of professional identity, self-efficacy, and persistence intentions in a context that is both understudied and of growing significance to the nation. The tool may also help

RAP leaders design programs that promote persistence and facilitate apprentice success in these challenging careers.

The purposes of this three-part research study included identifying and addressing some gaps in the literature on the experiences and needs of apprentices in essential occupations to inform both theory and practice. However, a critical stance in research requires not only describing the context and findings for the purposes of understanding them, but also to promote meaningful change for and by the people and communities involved. It requires that systems of power and the oppression of marginalized groups be at the center of inquiry (Strunk & Betties, 2019). As we conclude this dissertation, it is useful to take a critical approach to the three studies' collective findings.

Fundamental to understanding their contributions is the concept of equity. In an equitable RA system, each apprentice receives what they need to persist and succeed within their RAP and to access, through their successful participation, a family-sustaining career, regardless of intervening social, economic, and cultural factors. Promoting diversity, equity, and inclusion in apprenticeship involves developing an understanding of biases and unfair practices, however inadvertent, in RA and interrupting them (National Equity Project, 2023). As a group, workers in lower-prestige and lower-wage occupations are not able to access workplace learning and development opportunities as frequently as their higher-wage, higher-prestige counterparts (Hedayati-Mehdiabadi & Li, 2016) and are often less able to take advantage of opportunities that do present themselves because of barriers to participation that they are more likely to experience. These barriers include potential foundational skills gaps and less access to childcare, transportation, and free time to participate in non-work pursuits. Due to the fact that apprentices in lower-wage frontline healthcare roles are more likely than other healthcare workers to be members of marginalized groups (Wilbur et al., 2020), systemic discrimination may also be a barrier that impacts access to career training and advancement. These realities suggest a need for understanding the experiences of these apprentices, who are not well-represented in the literature and whose

life experiences may differ from those of higher-prestige and workers in ways that are consequential for learning and persistence. The first paper in this dissertation reviewed the literature and identified gaps in scholarly research on RA, particularly in regard to apprentices' learning and development and the programmatic elements that can promote the success of apprentices from marginalized groups. From a worldly perspective, the barriers that frontline apprentices face also suggest a need for informed and culturally responsive designs for adult and workplace learning programs, to ensure inclusion of diverse populations. The concept of equity is also relevant to experiences and outcomes for consumers of healthcare, as a diverse, well-supported healthcare workforce can improve healthcare access, experiences, and outcomes among marginalized patient populations (Jackson & Gracia, 2014).

As a model for workforce development and workforce learning, RA has the potential to enhance equity for apprentices in frontline occupations. Due to the fact that RAPs are typically low-cost or free to apprentices, they are accessible for those who cannot or will not pay the high cost of college. RA is fundamentally a job, and registered apprentices typically earn wages from the very beginning of their RAP. As the findings in our second paper illustrated, the RA model has built-in supports that address some of the barriers that frontline apprentices might face, including expert guidance from an experienced mentor, the encouragement and support of a cohort of peers, and the opportunity to do hands-on work in one's field as part of learning. Further, well-designed apprenticeship programs, like many which are jointly sponsored by a labor union or labor-management organization, can offer a number of wraparound services and interventions that are tailored to the needs of the individual apprentice and designed to ensure their success, including counseling, one-on-one tutoring, the purchase of materials for the apprentice, and test preparation services (T. Scott, personal communication, June 29, 2022). There is still much to do to advance equity in RA; most apprentices are still white and male (U.S. Department of Education, 2024). However, as the U.S. population ages and healthcare worker shortages grow, the affordances of RA can pave an accessible and inclusive path to skilled and higher-wage healthcare positions for

diverse aspiring professionals. Further scholarly research can and should identify the design elements of RAPs that best support them on that path. The third study in this dissertation led to the development of a survey tool that, once validated, may be used by both scholars and practitioners to gain insight into the experiences and needs of frontline healthcare apprentices.

Together, these three studies' complementary findings contributed to our understanding of an understudied context and shed light on the benefits and critical design elements of an increasingly utilized workforce development strategy in the U.S. Taken together, the findings can inform the ongoing growth and expansion of the RA model into new industries and contribute in a small way to the appropriate centering of the experiences and needs of frontline workers in the fields of workforce development and workplace learning.

References

Butrica, B. A., Jones, E., Rosenberg, L., Sattar, S., & Sotelo, V. (2023). *A review of the literature on registered apprenticeships.* Urban Institute.

Derse, J., & Bateman, T. (2021). *U.S. healthcare labor shortages compounded as a result of the pandemic.* Mercer. https://www.mercer.com/en-us/insights/us-health-news/us-healthcare-labor-shortages-compounded-as-a-result-of-the-pandemic/

Grundy, A. (2023). *Diversity, equity, and inclusion key to filling high-skilled manufacturing jobs.* Census.gov. https://www.census.gov/library/stories/2023/09/manufacturing-faces-labor-shortage.html#:~:text=About%201.4%20million%20manufacturing%20jobs,the%20Manufacturing%20Institute%20(MI).

Jackson, C. S., & Gracia, J. N. (2014). Addressing health and health-care disparities: The role of a diverse workforce and the social determinants of health. *Public Health Reports, 129*, 57-61. https://doi.org/10.1177/00333549141291s211

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Linos, E., Ruffini, K., & Wilcoxen, S. (2022). Reducing burnout and resignations among frontline workers: A field experiment. *Journal of Public Administration Research and Theory*, *32*(3), 473-488. https://doi.org/10.2139/ssrn.3846860

McSwigan, C. (2023). *How to improve the registered apprenticeship system.* Third Way. https://www.thirdway.org/report/how-to-improve-the-registered-apprenticeship-system

National Equity Project. (2024). *Educational equity: A definition.* https://www.nationalequityproject.org/education-equity-definition

Sablik, T. (2022). The rural nursing shortage. *Econ Focus, (1Q),* 4-7. feature1.pdf (richmondfed.org)

Schmitt, J., & deCourcy, K. (2022). *The pandemic has exacerbated a long-standing national shortage of teachers.* Economic Policy Institute.

U.S. Department of Education. (2024). *Equity snapshot: Apprenticeships in America.* https://sites.ed.gov/hispanic-initiative/2021/11/equity-snapshot-apprenticeships-in-america/

U.S. Department of Labor. (2023a). *Department of Labor awards $64m to help states increase, expand access to registered apprenticeships in high-growth, high-demand industries.* https://www.dol.gov/newsroom/releases/eta/eta20230719

U.S. Department of Labor. (2023b). *FY 2021 Data and statistics.* https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021

Wenger E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge University Press. https://doi.org/10.1016/b978-0-7506-7293-1.50004-4

Wilbur, K., Snyder, C., Essary, A. C., Reddy, S., Will, K. K., & Saxon, M. (2020). Developing workforce diversity in the health professions: A social justice perspective. *Health Professions Education*, *6*(2), 222-229. https://doi.org/10.1016/j.hpe.2020.01.002

Appendix A: All Papers Included in the Systematic Literature Review and Research Synthesis

Key: An X in the following columns indicates the paper:

NPR: was from non-peer reviewed sources (Practice Literature or Dissertation/Thesis)

1: Theme 1: Expansion

2: Theme 2: Benefits

3: Theme 3: Nontraditional Groups' Outcomes

Citation	*NPR*	*1*	*2*	*3*
Amoyaw, M., & Brown, D. (2018). Apprenticeship America: An idea to reinvent postsecondary skills for the digital age. Washington, DC: Third Way.	X	X	X	
Arabandi, B., Boren, Z., & Campbell, A. (2021). *Building sustainable apprenticeships: The case of Apprenticeship 2000*. Washington, DC: Urban Institute.	X	X	X	
Argyres, A., & Moir, S. (2008). Building trades apprentice training in Massachusetts: An analysis of union and non-union Programs, 1997-2007 (Paper No. 2). Boston, MA: Labor Resource Center Publications.	X			X
Ayres, S. (2014). Apprenticeships in the United States: Can they improve youth employment outcomes? In G. Randolph (Ed.). *Overcoming the youth employment crisis* (pp. 37-47). Washington, DC: Just Jobs Network.	X		X	
Becht, C. (2019). Apprenticing America: The effects of tax credits for registered apprenticeship programs [Master's Thesis, Georgetown University].	X	X	X	
Beer, A. (2019). Apprenticeships: An emerging community college strategy for workforce development. Washington, DC: Association of Community College Trustees.	X	X	X	X
Bergman, T., & Kobes, D. (2017). *The state of apprenticeship among workforce boards.* Boston, MA: Jobs for the Future.	X	X	X	
Bergstrom, K. (2020). What's working: Recruiting women into apprenticeships. *Plans & Trusts, 38*(2), 4-6.			X	

Citation	*NPR*	*1*	*2*	*3*
Berik, G., & Bilginsoy, C. (2000). Do unions help or hinder women in training? Apprenticeship programs in the United States. *Industrial Relations: A Journal of Economy and Society, 39*(4), 600-624.doi: 10.1111/0019-8676.00185				X
Berik, G., & Bilginsoy, C. (2002). Unions and women's training for the skilled trades in the US. *The Review of Black Political Economy, 29*(4), 97-122. doi:10.1007/bf02717299				X
Berik, G., & Bilginsoy, C. (2006). Still a wedge in the door: Women training for the construction trades in the USA. *International Journal of Manpower, 27*(4), 321-341. doi:10.1108/01437720610679197				X
Berik, G., Bilginsoy, C., & Williams, L. S. (2011). Gender and racial training gaps in Oregon apprenticeship programs. *Labor Studies Journal, 36*(2), 221-244. doi:10.1177/0160449X10396377				X
Bilginsoy, C. (2003). The hazards of training: Attrition and retention in construction industry apprenticeship programs. *ILR Review, 57*(1), 54-67. https://doi.org/10.1177/001979390305700103				X
Bilginsoy, C. (2005). How unions affect minority representation in building trades apprenticeship programs. *Journal of Labor Research, 26*(3), 451-463. doi:10.1007/s12122-005-1014-4				X
Bilginsoy, C. (2007). Delivering skills: Apprenticeship program sponsorship and transition from training. *Industrial Relations, 46*(4), 738-765. doi:10.1111/j.1468-232X.2007.00495.x				X
Bilginsoy, C. (2018). Unemployment, the Great Recession, and apprenticeship attrition in the U.S. *Journal of Vocational Education & Training, 70*(2), 171-192. doi:10.1080/13636820.2017.1392999			X	X
Bishop, M. J. (2017). An assessment of electrical apprenticeship paid related instruction in the Midwest technical college system based on situated learning theory. Unpublished master's thesis, University of Wisconsin-Stout.	X			
Boi, K. J. (1993). *A nation of programs with no system: Apprenticeship in America*. Washington, DC: The Industrial College of the Armed Forces.	X		X	
Bona, D. J. (1997). *Registration of apprenticeship programs and the turnover of skilled trade employees* (Publication No. 1648) [Doctoral dissertation, Western Michigan University]. Scholarworks at WMU.	X		X	
Bosch, G., & Charest, J. (2008). Vocational training and the labour market in liberal and coordinated economies. *Industrial Relations Journal, 39*(5), 428-447. doi:10.1111/j.1468-2338.2008.00497.x			X	
Bower, L. M. (2007). *The experiences of five women in a skilled trade apprenticeship program.* [Doctoral dissertation, The University of Nebraska]. Proquest.	X			X
Bradley, D. H., & Herzenberg, S. A. (2002*). Construction apprenticeship and training in Pennsylvania.* Harrisburg, PA: Keystone Research Center.	X	X	X	X
Browning, B., & Sofer, N. (2017). *Making apprenticeship work for opportunity youth.* Boston, MA: Jobs for the Future.	X	X		X
Byrd, B. (1999). Women in carpentry apprenticeship: A case study. *Labor Studies Journal, 24*(3), 3-22. doi:10.1177/0160449X9902400301				X

Citation	*NPR*	*1*	*2*	*3*
Cai, J. (2018). A new look at apprenticeship: Linking school to 21st century skills. Alexandria, VA: Center for Public Education.	X	X	X	
Cantor, J. A. (1994). Apprenticeships and community colleges: Linkages in America's defense. *Journal of Industrial Teacher Education, 31*(3), 8.			X	
Cantor, J. A. (1995). Apprenticeships link community-technical colleges and business and industry for workforce training. *Community College Journal of Research and Practice, 19*(1), 47-71. doi: 10.1080/1066892950190105			X	
Cheney, G. R. (2017). *Apprenticeship in brief: A discussion paper*. New York, NY: Committee for Economic Development.	X	X	X	
Colborn, J. (2015). *Recasting American apprenticeship*. Washington, DC: The Aspen Institute. https://www.aspeninstitute.org/publications/recasting-american-apprenticeship/	X	X	X	X
Collins, B. (2016). *Apprenticeship in the United States: Frequently asked questions*. (CRS Report R44174, Version 3).Congressional Research Service. Retrieved January 8, 2022, from https://files.eric.ed.gov/fulltext/ED603129.pdf	X			
Copeman Petig, A., Chávez, R., & Austin, L. J. (2019). Strengthening the knowledge, skills, and professional identity of early educators: The impact of the California SEIU Early Educator Apprenticeship Program. Berkeley, CA: Center for the Study of Child Care Employment.	X	X	X	X
Craig, R., & Bewick, T. (2018). *Making apprenticeships work: Five policy recommendations*. New York, NY: University Ventures.	X		X	
Cregg, J. G., & English, J. (1994). *A study to assess the post-treatment effectiveness of pedagogical instruction for union apprenticeship instructors* (Publication No. 799) [Master's thesis, California State University]. CSUSB Scholarworks.	X			
Crewe, Y. M. (2020). *The impact of registered apprenticeships on the middle-skills gap in Virginia* [Doctoral dissertation, Virginia Commonwealth University]. VCU Scholars Compass.	X		X	
Dawson, S. L. (2016). The SEIU healthcare NW training partnership in Washington state. *Generations, 40*(1), 88-91.	X			
de Alva, J. K., & Schneider, M. (2018). *Apprenticeships and community colleges: Do they have a future together?* Washington, DC: American Enterprise Institute.	X			
Decker, D. (2019). Student perceptions of higher education and apprenticeship alignment. *Education Sciences, 9*(2), 86. doi: 10.3390/educsci9020086		X	X	
Dimeny, E. (2019). *Skilling up: The scope of modern apprenticeship*. Washington, DC: Urban Institute.	X	X	X	X
Doty, A. V., & Odom, R. T. (1997). The apprenticeship revival: Examining community college practices. *New Directions for Community Colleges, 97*, 61-71. doi:10.1002/cc.9707		X		
Eisenberg, S. (2018). We'll call you if we need you: Experiences of women working construction. Ithaca, NY: Cornell University Press.	X			X

Citation	*NPR*	*1*	*2*	*3*
Ensuring economic opportunities for young Americans: Hearings before the U.S. House of Representatives Committee on Education and Labor, 110th cong. (2009) (Testimony of Algernon Austin). https://edlabor.house.gov/imo/media/doc/documents/111/pdf/testimony/20091001AlgernonAustinTestimony.pdf	X	X		
Fullagar, C., McCoy, D., & Shull, C. (1992). The socialization of union loyalty. *Journal of Organizational Behavior, 13*(1), 13-26. doi:10.1002/job.4030130103			X	
Fuller, R. (2016). *An analysis of registered apprenticeship programs in the California community colleges* (10182813) [Doctoral dissertation, California State University, Sacramento]. Proquest.	X			
Gaudet, C., Annulis, H., & Kmiec, J. (2010). Measuring the impact of a pilot geospatial technology apprenticeship program for the Department of Labor. *Performance Improvement, 49*(10), 28-38. doi:10.1002/pfi.20183		X		
Glover, R. W., & Bilginsoy, C. (2005). Registered apprenticeship training in the US construction industry. *Education & Training, 47*(4-5), 337-349. doi:10.1108/00400910510601913				X
Glover, R. W., Clopton, L., McCollum, M., & Wang, X. (2007). Building an apprenticeship and training system for maintenance occupations in the American transit industry. *Education + Training, 49*(6), 474-488. doi: 10.1108/00400910710819127		X		
Gordon, H. R. D. (2003). Selected factors of teaching effectiveness: Perceptions of apprenticeship trainers. *Journal of Technology Studies, 29*(1), 56-59. doi:10.21061/jots.v29i1.a.9			X	
Gospel, H. (1994). The survival of apprenticeship training: A British, American, Australian comparison. *British Journal of Industrial Relations, 32*(4), 505-522. doi:10.1111/j.1467-8543.1994.tb01048.x		X		
Gunn, P., & De Silva, L. (2008). *Registered apprenticeship: Findings from site visits to five states*. Washington, DC: U.S. Department of Labor, Employment and Training Administration.	X		X	
Hanks, A., McGrew, A., & Zessoules, D. (2018). *The apprenticeship wage and participation gap*. Washington, DC: Center for American Progress.	X			X
Hanson, D., & Lerman, R. I. (2016). Military apprenticeships in the US: An implementation evaluation. *Education + Training, 58*(6), 597-612. doi:10.1108/ET-01-2016-0013		X		
Harrington, C. L. (2019). *Factors influencing whether firms engage in apprenticeship* (Publication No. 27545782) [Doctoral dissertation, North Carolina Agricultural and Technical State University]. Proquest.	X		X	
Hatcher, T. (1995). From apprentice to instructor: Work ethic in apprenticeship training. *Journal of Industrial Teacher Education, 33*(1).			X	
Hecker, I., & Kuehn, D. (2019). *Apprenticeship and the justice system*. Washington, DC: Urban Institute.	X	X		X
Helmer, M., & Conway, M. (2014). Workforce intermediaries and the apprenticeship system: Lessons and implications from the construction industry. In M. Conway & R. P. Giloth (Eds.). *Connecting people to work: Workforce intermediaries and sector strategies* (pp. 325-347). New York, NY: Aspen Institute.	X	X	X	
Helper, S., Noonan, R., Nicholson, J. R., & Langdon, D. (2016). *The benefits and costs of apprenticeships: A business perspective*. Washington, DC: US Department of Commerce.	X	X		

Citation	*NPR*	*1*	*2*	*3*
Herzenberg, S., Polson, D., & Price, M. (2018). *Construction apprenticeship and training in Pennsylvania.* Philadelphia, PA: Capital Area Labor-Management Council, Inc.	X			X
Hetzer, T. (2003). Perceptions of machine trades apprenticeship instructors towards online instruction. Unpublished master's thesis, University of Wisconsin-Stout.	X			
Hollenbeck, K., & Huang, W. J. (2016). *Net impact and benefit-cost estimates of the workforce development system in Washington state.* Upjohn Institute for Employment Research. doi: 10.17848/tr06-020	X		X	
Hood, J. S. (2007). *A return on investment study of apprenticeship programs in the state of Arkansas for the years 2000 through 2005* (Publication No. 3257877) [Doctoral dissertation, University of Arkansas]. UMI Microform, Proquest.	X		X	
Howze, P. B. (2015). *American apprenticeship as a transformative learning experience: A phenomenology*. Unpublished doctoral dissertation, North Carolina State University.	X		X	
Hunt, B. R. (2020). *Apprenticeship participation at GE Appliances: An insider's ethnographic study of apprentice participation and factors contributing to student success* (Publication No. 179) [Doctoral dissertation, Western Kentucky University]. Topscholar.	X			
Jacoby, T., & Lerman, R. I. (2019). *Industry-driven apprenticeship: What works, what's needed*. Washington, DC: Opportunity America.	X	X	X	
Johnson, M. L., & Lambeth, J. M. (2017). Redefining instruction in apprenticeship training. *Plans & Trusts, 35*(1), 14-18.	X			
Johnson, M., & Spiker, K. (2018*). Broadening the apprenticeship pipeline*. Washington, DC: National Skills Coalition.	X			X
Jopson, A. D., Skillman, S. M., & Frogner, B. K. (2019). *Use of apprenticeship to meet demand for medical assistants in the US*. Seattle, WA: Center for Health Workforce Studies, University of Washington.	X	X		
Kaskutas, V., Dale, A. M., Lipscomb, H., Gaal, J., Fuchs, M., & Evanoff, B. (2010). Changes in fall prevention training for apprentice carpenters based on a comprehensive needs assessment. *Journal of Safety Research, 41*(3), 221-227. doi:10.1016/j.jsr.2010.01.006			X	
Koller, V. (2018). *Closing the gap: The future of apprenticeship in California*. Boston, MA: Jobs for the Future.	X	X	X	X
Kuehn, D. (2019). Registered apprenticeship and career advancement for low-wage service workers. *Economic Development Quarterly, 33*(2), 134-150. doi:10.1177/0891242419838605		X	X	X
Kuehn, D. P. (2017). *Diversity and inclusion in apprenticeship expansion.* Washington, DC: Urban Institute.	X	X		X
Kuehn, D., & Jones, D. A. (2018). *Sub-baccalaureate STEM education and apprenticeship.* Washington, DC: Urban Institute.	X	X		
Kuehn, D., Hecker, I., & Simon, A. (2019). *Registered apprenticeship in science and engineering*. Washington, DC: Urban Institute. https://files.eric.ed.gov/fulltext/ED595859.pdf	X	X	X	X

Citation	*NPR*	*1*	*2*	*3*
Lazaryan, N., Neelakantan, U., & Price, D. A. (2014). *The prevalence of apprenticeships in Germany and the United States* (Report No. 14-08). Federal Research Bank of Richmond.	X	X		
Lerman, R. (2010). *Expanding apprenticeship: A way to enhance skills and careers.* Washington, DC: Urban Institute.	X	X	X	
Lerman, R. (2019). Scaling apprenticeship to increase human capital. In M. S. Kearney & E. Bowles (Eds.), *Expanding economic opportunity for more Americans* (pp. 56-75). Washington, DC: Aspen Institute.	X	X	X	
Lerman, R. I. (2010). Apprenticeship in the United States: Patterns of governance and recent developments. In E. Smith, & F. Rauner (Eds.), *Rediscovering apprenticeship* (pp. 73-77). Springer.	X	X	X	
Lerman, R. I. (2013a). Expanding apprenticeship in the United States: Barriers and opportunities. In A. Fuller & L. Unwin (Eds.), *Contemporary apprenticeship: International perspectives on an evolving model of learning* (pp. 105-124). New York, NY: Routledge.	X	X	X	
Lerman, R. I. (2013b). Marketing apprenticeship in the United States: The case of South Carolina. In S. Akoojee, P. Gonon, U. Hauschildt, & C. Hofmann (Eds.), *Apprenticeship in a globalised world: Premises, promises and pitfalls* (pp. 81-84). LIT Verlag Munster.	X	X		
Lerman, R. I. (2014). Expanding apprenticeship opportunities in the United States. In M. S. Kearney & B. H. Harris (Eds.), *Policies to address poverty in America* (pp. 79-86). Washington, DC: The Hamilton Project at the Brookings Institution.	X	X	X	
Lerman, R. I. (2016a). Can we develop enough skills for a robust manufacturing industry? *Challenge, 59*(3), 157-177. doi: http://dx.doi.org/10.1080/05775132.2016.1178557		X	X	
Lerman, R. I. (2016b). Reinvigorate apprenticeships in America to expand good jobs and reduce inequality. *Challenge, 59*(5), 372-389.		X	X	X
Lerman, R. I., & Rauner, F. (2012). Apprenticeship in the United States. In A. Barabasch & F. Rauner (Eds.), *Work and education in America* (pp. 175-193). Springer.	X	X	X	
Lerman, R. I., Eyster, L., & Kuehn, D. (2014). Can we upgrade low-skill, low-wage occupations? The case of apprenticeships in the long-term care occupations. *Journal of Women, Politics & Policy, 35*(2), 110-132.		X	X	
Lerman, R. I., Loprest, P., & Kuehn, D. (2020). *Training for jobs of the future: Improving access, certifying skills, and expanding apprenticeship* (IZA Policy Paper No. 166). Bonn, Germany: Institute of Labor Economics.	X	X	X	
Lerman, R., Eyster, L., & Chambers, K. (2009). The benefits and challenges of registered apprenticeship: The sponsors' perspective. Washington, DC: Urban Institute.	X		X	
Lerman, R., Hanson, D., Dobson, C., Tanamor, M., & Blatt, L. (2015). The United Services Military Apprenticeship Program (USMAP): Implementation study and feasibility of an impact study. Washington, DC: Urban Institute.	X	X	X	
Love, I., & McCarthy, M. A. (2018). Apprenticeship and the future of nursing: An equity-based strategy to address the bachelor's degree gap. Washington, DC: New America.	X	X	X	

Citation	*NPR*	*1*	*2*	*3*
Love, I., & Prebil, M. (2019). *Apprenticeship in nursing today*. Washington, DC: New America.	X	X	X	X
Mandina, M. (2019). *Apprenticeship: Precision optics manufacturing technician* [Paper presentation]. Fifteenth Conference on Education and Training in Optics and Photonics, Quebec, Canada. doi: 10.1117/12.2523781	X	X		
Manzo, J., Manzo IV, F., & Bruno, M. R. (2019). *The impact of construction apprenticeship programs in Minnesota: A return-on-investment analysis*. St. Paul, MN: Midwest Economic Policy Institute.	X		X	X
Mauldin, B. (2011). *Apprenticeships in the healthcare industry*. Washington, DC: Administration for Children and Families, U.S. Department of Health & Human Services.	X	X		
McCarthy, M. A., Palmer, I., & Prebil, M. (2017). *Connecting apprenticeship and higher education: Eight recommendations.* Washington, DC: New America.	X			
McGrew, A., & Hanks, A. 2017. *The case for paid apprenticeships behind bars*. Washington, DC: Center for American Progress.	X			X
Messina, J., & Dvorkin, E. (2019). *Expanding tech apprenticeships in New York City*. Center for an Urban Future.	X	X		
Messing-Mathie, A. (2015). Building apprenticeship systems for middle-skill employment: Comparative lessons in innovation and sector-based strategies for apprenticeships. Washington, DC: National Academies Board on Science, Technology, and Economic Policy.	X		X	
Mollica, J. (2020). Opening doors to apprenticeship for English language learners. *COABE Journal, 9*(1), 13-24.	X			X
Nehls, H. (2019). Strengthening international exchange and cooperation with labor unions in America in the field of apprenticeship/vocational training. Erkrath, Germany: Federal Ministry of Education and Research.	X			X
Noworol, C. (2020). Apprenticeships and career pathways. In J. W. Hedge & G. W. Carter (Eds.), *Career pathways: From school to retirement* (pp. 62-80). Oxford University Press. doi: 10.1093/oso/9780190907785.001.0001	X		X	
Olinsky, B., & Ayres, S. (2013). *Training for success: A policy to expand apprenticeships in the United States.* Washington, DC: Center for American Progress.	X	X		
Payne, J. (2020). The next-gen IMT apprenticeship: A return on investment study. Boston, MA: Jobs for the Future.	X	X		
Payne, J. R. (2016). *A pilot benefit and cost analysis study of sponsors of registered apprenticeship in Maine* (Publication No. 10249315) [Doctoral dissertation, University of Southern Maine]. Proquest.	X	X		
Poe-Yamagata, E., Nanda, N., Corea, C., Roy, M., Patterson, L., & Salas-Kos, G. (2018). *Feasibility study and evaluation of non-traditional occupation demonstrations*. Washington, DC: U.S. Department of Labor, Employment and Training Administration.	X			X
Porter, R. D., Vroonland, J. E., & Buckingham, R. S. (1997). Predictors of students' success in the medical service apprentice course. *Military Medicine, 162*(7), 495-500.			X	
Prebil, M. (2019). Solid foundations: Four state policy approaches for supporting college-connected apprenticeships. New America. https://files.eric.ed.gov/fulltext/ED599749.pdf	X			
Prebil, M. (2020). Chicago's strategies for apprenticeship expansion. Washington, DC: New America.	X	X		X

Citation	*NPR*	*1*	*2*	*3*
Public Sector Consultants, Inc. (2017). *Benefits of Michigan apprenticeship pro*grams. Lansing, MI: Author.	X		X	X
Reed, D., Liu, A. Y.-H., Kleinman, R., Mastri, A., Reed, D., Sattar, S., & Ziegler, J. (2012). *An effectiveness assessment and cost-benefit analysis of registered apprenticeship in 10 states*. Mathematica Policy Research.	X		X	X
Riccucci, N. M. (1991). Apprenticeship training in the public sector: Its use and operation for meeting skilled craft needs. *Public Personnel Management, 20*(2), 181. doi:10.1177/009102609102000206		X		X
Rice, O., Hudson, J., Foster, L. R., & Klein, S. (2016). *Connecting secondary career and technical education and registered apprenticeship: A profile of six state systems*. Washington, DC: Office of Career, Technical, and Adult Education, US Department of Education.	X			
Rossmeier, V. (2015). *Apprenticeships: In New Orleans & Louisiana* (Issue brief No. 5). New Orleans, LA: Cowen Institute.	X	X	X	
Sack, M., & Allen, L. (2019). Connecting apprenticeships to the young people who need them most: The role of community-based organizations. Boston, MA: Jobs for the Future.	X		X	
Saylor, W. G., & Gaes, G. G. (1997). Training inmates through industrial work participation and vocational and apprenticeship instruction. *Corrections Management Quarterly, 1*(2), 32-43.				X
Scott, G. (2016). Work-based learning in action: The industrial manufacturing technician apprenticeship. Boston, MA: Jobs for the Future.	X	X		
Sharp, N., & Dvorkin, E. (2018). *The promise of apprenticeships in New York*. New York, NY: Center for an Urban Future.	X	X		
Smith, N. (2002). *Apprenticeship program is beneficial, but its ability to meet state demands is limited*. Tallahassee, FL: Office of Program Policy Analysis and Government Accountability.	X		X	
Snell, A., Voss, J., & Kline, J. (2017). *Attitudes towards apprenticeship programs*. Lake Research Partners.	X	X		
Stieritz, A. M. (2009). Apprenticeship Carolina™: building a 21st century workforce through statewide collaboration. *Community College Journal of Research and Practice, 33*(11), 980-982. doi: 10.1080/10668920903153485		X		
Stoker, G., Clark, U., Vanajakumari, M., & Wetherill, W. (2021). Building a cybersecurity apprenticeship program: Early-stage success and some lessons learned. *Information Systems Education Journal, 19*(2), 35-44.		X		
Stoner, G. (2015). *Instructors' perceptions of online instruction within registered apprenticeship programs* (Publication No. 3716045) [Doctoral dissertation, Southern Illinois University at Carbondale]. Proquest.	X			
Sullivan, M. (2018). Effective employer engagement practices: Observations from select technology apprenticeship programs. Boston, MA: Jobs for the Future.	X	X	X	
Swan, K. C. (2005). Vocational interests (the self-directed search) of female carpenters. *Journal of Counseling Psychology, 52*(4), 655-657. doi:10.1037/0022-0167.52.4.655				X

Citation	*NPR*	*1*	*2*	*3*
Swegle, R. W. (2017). Characteristics of United Brotherhood of Carpenters and Joiners of America apprentice graduates of completing the apprenticeship program in Illinois. Unpublished doctoral dissertation, University of Wisconsin-Stout.	X			
Systems, E. (2015). *Registered apprenticeship programs: Improving the pipeline for people with disabilities*. U.S. Department of Labor, Office of Disability Employment Policy.	X			X
U.S. Department of Labor. (2013). 21st century registered apprenticeship: A shared vision for increasing opportunity, innovation, and competitiveness for American workers and employers. Washington, DC: Author.	X	X	X	
U.S. Department of Labor/Employment and Training Administration. (2009). The greening of Registered Apprenticeships: An environmental scan of the impact of green jobs on registered apprenticeship and implications for workforce development. Author.	X	X		
Uttley, C., & Horm, D. (2008). Mentoring in Early Childhood Professional Development: Evaluation of the Rhode Island Child Development Specialist Apprenticeship Program. *Journal of Early Childhood Teacher Education, 29*(3), 237-252. doi:10.1080/10901020802275286		X	X	
Uwakweh, B. O. (2006). Motivational climate of construction apprentice. *Journal of Construction Engineering & Management, 132*(5), 525-532. doi:10.1061/(ASCE)0733-9364(2006)132:5(525)			X	
Vice, T. M. (2019). Can apprenticeships alleviate a regional skills gap?: A case study of programs at Trident Technical College in Charleston, SC. Unpublished master's thesis, Massachusetts Institute of Technology.	X		X	
Waddoups, J., & Duncan, K. (2019). The impact of Nevada's ninety-percent prevailing wage policy on school construction costs, bid competition, and apprenticeship training. Washington, DC: National Alliance for Fair Contracting.	X			X
Wein, M. (2016). *An analysis of registered apprenticeships in Michigan*. Lansing, MI: State of Michigan Department of Technology, Management and Budget, Bureau of Labor Market Information and Strategic Initiatives.	X		X	X
Welton, A. D., & Owens, D. R. (2017). *Scaling up registered apprenticeships at Illinois community colleges.* University of Illinois at Urbana-Champaign, The Office of Community College Research and Leadership.	X			
Woods, J. G. (2012). An analysis of apprentices in the US construction trades: An overview of their training and development with recommendations for policy makers. *Education + Training, 54*(5), 401-418. doi:10.1108/00400911211244696			X	
Workman, E. (2019). Earning while learning with early educator apprenticeship programs. Washington, DC: New America.	X	X	X	X
Zessoules, D., & Olugbenga, A. (2018). Wage gaps and outcomes in apprenticeship programs: The effects of gender, race, and region. Washington, DC: Center for American Progress.	X			X
Total: 134	Total: 98	Total: 63	Total: 67	Total: 45

Appendix B: Survey Item Development Guidelines Checklist

We were guided in this study by survey development methodology. We summarize our use of the guideline checklist (Dillman, 2016), omitting those criteria that were not relevant to our survey development process.

Guidelines	***Examples from our survey development process***
2. Guidelines for Applying Social Exchange	
1: Use a holistic approach to design	• We designed the survey to be anonymous, to encourage full and honest responses from apprentices. We emphasized in the front matter of the survey the ways in which participation was voluntary and low risk. • Though we were unable to provide incentives to participate, we emphasized in the front matter that the study could help other apprentices in the future: *We cannot compensate you for taking the survey. However, the study findings may help other apprenticeship programs support apprentices to feel confident in their work, stay in their programs, and find success in their healthcare careers.* • The initial survey was long, but we emphasized during the expert review and pilot test phases that an explicit goal of these phases was to make it shorter.
2: Social exchange concepts should be applied differently depending on the survey population, topic, sponsorship, and survey mode(s) available	
3: Identify and evaluate whether to change or eliminate design constraints that are especially likely to have a negative impact on response and data quality	
4. Guidelines for Choosing Words and Forming Questions	
1: Choose the appropriate question format	• We chose specific, simple, concrete language as often as possible in both the close-ended and open-ended questions. We also were careful to ask only one question at a time, using short complete interrogative sentences. The following examples illustrate these characteristics: - *How true or untrue are the following statements about you?* - *What has helped you learn in your RTI classes?* - *What would you change about how your mentor works with you?* - *Did you complete a pre-apprenticeship program?*
2: Make sure the question applies to the respondent	
3: Ask one question at a time	
4: Make sure the question is technically accurate	
5: Use simple and familiar words	
6: Use specific and concrete words to specify the concepts clearly	
7: Use as few words as possible to pose the question	
8: Use complete sentences that take a question form, and use simple sentence structures	
9: Make sure "yes" means yes and "no" means no	
10: Organize questions in a way to make it easier for respondents to comprehend the response task	
5. Guidelines for Writing Open-Ended Questions	
1: Specify the type of response desired in the question stem	• We used only 1-2 open-ended questions at a time, so as not to overwhelm the respondent. • We used nondirective probes often, as in this example: *How has your self-confidence at work changed throughout your apprenticeship program? Can you share an example?*
3: Provide extra motivation to respond	
4: Use nondirective probes to obtain more information on open ended items	

5. General Guidelines for Writing All Types of Closed-Ended Questions	
5: When asking either/or types of questions, state both the positive and negative side in the question stem	• We included both the positive and negative side in the question stem in every such question. For example: *At this moment in time, how strong or weak would you say your commitment is to complete your apprenticeship program?* • Our 7-point scales contain all possible reasonable answers, and we sometimes added an 8th point when needed, such as in the following example: *How true or untrue is each statement below of your mentor in the apprenticeship program? (If you do not receive mentoring, check "Not mentored.").* Answer categories: *Very untrue / Untrue / Somewhat untrue / Neither / Somewhat true / True / Very true / Not mentored*
6: Develop lists of answer categories that include all reasonable possible answers	
7: Develop lists of answer categories that are mutually exclusive	
5. Guidelines for Nominal Closed-Ended Questions	
10: Avoid bias from unequal comparisons	• Our nominal close-ended questions avoided bias by using simple, judgement-free language and offering lists that include all reasonable possible answers, as in this demographic question about gender identity: *How do you describe our gender identity?* Answer categories: *Female / Male / Transgender Female / Transgender Male / Non-binary / Gender-variant – Nonconforming/ Other: _____*
5. Guidelines for Ordinal Closed-Ended Questions	
13: Choose between a unipolar or a bipolar scale	• In our ordinal, close-ended questions, we chose 7-point, bipolar scales with natural metrics, where in categories are relatively equal distances apart. We also labeled all categories. These item characteristics are shown in the example below: *Within in the next 5 years, how certain or uncertain are you that you will be working in any healthcare career?* Answer categories: *Very certain / Uncertain / Somewhat uncertain / Neither / Somewhat certain / Certain / Very certain*
14: Choose an appropriate scale length—in general, limit scales to four or five categories	
15: Choose direct or construct-specific labels to improve cognition	
16: If there is a natural metric (e.g., frequencies, amounts, sizes, etc.), use it instead of vague quantifiers	
17: Provide balanced scales where categories are relatively equal distances apart conceptually	
18: Verbally label all categories	
6. Guidelines for the Visual Presentation of Open-Ended Questions	
9: Provide answer spaces that are sized appropriately for the response task	• The fillable answer spaces were automatically provided by Google Forms, expanding easily when a respondent types within them. Each one was labeled *Your answer* so that it was clear where respondents should enter text.
6. Guidelines for the Visual Presentation of Questionnaire Pages or Screens	
14: Establish grouping and subgrouping within and across questions in the questionnaire	

15: Establish consistency in the visual presentation of questions, and use alignment and vertical spacing to help respondents organize the information on the page	• Google Forms automatically provided consistency in the visual presentation, alignment, and spacing. Organization was clear. • We organized questions in sets according to constructs and often added orienting language at the beginning of a question or section, as in the following example of a orienting sentence and an ordinal question stem: *These questions are about the experiences you have had providing care to another person.* *How true or untrue are the following statements about you?*
18: Consistently identify the beginning of each question and/or Section	
7. Question Order	
1: Group related questions that cover similar topics together	• The survey began with questions that were relevant to all respondents. These are the first three survey questions: -Are you currently an apprentice in a registered apprenticeship program? Yes/no - Which best describes your frontline healthcare occupation? (Answer include drop-down menu with many frontline healthcare occupational categories) -Please write the specific occupation you are apprenticing for. • We grouped related questions together. For example, we clustered all the questions pertaining to healthcare professional identity, healthcare self-efficacy, and intent to persist in healthcare in the beginning. Items pertaining to caregiver identity and self-efficacy were also clustered, later in the survey. • We had very few sensitive questions in the survey but we did place the demographic questions, including those asking about gender identity, racial and ethnic groups, etc., at the end.
2: Begin with questions likely to be salient to nearly all respondents and choose the first question carefully	
3: Place sensitive or potentially objectionable questions near the end of the questionnaire	
5: Ask questions about events in the order the events occurred	
6: Avoid unintended question order effects	
7. Testing Questions and Questionnaires	
7: Obtain feedback on the draft questionnaire from content, questionnaire, and analysis experts	• We obtained feedback on the draft survey from experts (n=6) • We conducted cognitive interviews with the survey among individuals (n=10) who shared similar characteristics with the target population. • We conducted a pilot study (n=71) with a subsample of the population to evaluate the survey, using the Google Form itself. • We carefully documented and archived materials pertaining to the survey design process.
8: Conduct cognitive interviews of the complete questionnaire in order to identify wording, question order, visual design, and navigation problems	
9: Conduct experimental evaluations of questionnaire components	
10: Conduct a small pilot study with a subsample of the population to evaluate the questionnaire	
12: Conduct testing in the mode or modes that will be used to complete the questionnaire	
13: Document and archive all aspects of the survey design	
9. Guidelines for Designing Web and Mobile Questionnaires	

1: Decide how the survey will be programmed and hosted	• Google Forms, our chosen survey platform, was accessible by browser and by mobile phone. It utilized a consistent layout with its mild color contrasts (white question boxes against light purple background)The welcome screen was clear and as simply written as we could make it, while still carefully including IRB-approved explanation and consent language. • Google Forms assigned each respondent a unique ID number. It did not include a graphical progress indicator and allowed respondents to back up in the survey. None of the responses were required; all were optional. • It was challenging to create a survey will all the items that we needed to test to answer our research questions, while also keeping the survey short enough to appeal to the audience. The final version of the survey is somewhat shorter, able to be answered in about 10 minutes or less.
2: Evaluate the technological capabilities of the survey population	
3: Take steps to ensure that questions display similarly across different devices, platforms, browsers, and user settings	
4: Offer a questionnaire optimized for mobile (browser or app based)	
6: Create interesting and informative welcome and closing screens that will have wide appeal to respondents	
8: Use a consistent page layout across screens and visually emphasize information that is essential to completing the survey while deemphasizing inessential information	
9: Allow respondents to back up in the survey	
10: Do not require responses to questions unless absolutely necessary for the survey	
13: Do not include a graphical progress indicator	
14: Use audiovisual capabilities of the web sparingly, and evaluate the differential effect they may have on respondents	
20: Carefully and strategically time all contacts with the population in mind	
23: Take steps to ensure that e-mails are not flagged as spam	
24: Assign each sample member a unique ID number	
9. Quality Control and Testing Guidelines for Web and Mobile Surveys	
26: Obtain expert review and conduct cognitive interviews, experimental evaluations, and pilot studies of web implementation materials and procedures	• We engaged in expert review, cognitive interviews, a pilot study and a statistical evaluation of the survey. • We tested the survey with desktop computers, tablets, and a mobile phone. • We asked numerous friends and colleagues to test the survey in its online form before we conducted the pilot test. • The survey was anonymous, so respondents were directed to send any queries to the researchers using provided contact information. We received no inquiries. • We used IRB-approved methods of data security, including a password-protected survey and unique identifiers.
27: Test the survey using a variety of devices, platforms, connection speeds, browsers, and user-controlled settings, and test the database to ensure that items are collected and coded correctly	
30: Establish procedures for dealing with respondent inquiries	
31: Implement a system for monitoring progress and evaluating early completes	
32: Develop procedures to ensure data security	

Appendix C: Tool for Expert Review

We created the review tool below to guide experts in their evaluation of the draft survey.

Survey on Identity, Self-Efficacy, and Persistence Intentions Among Frontline Healthcare Apprentices:

Expert Review

Name:
Position or Title:
Institution or Place of Work:
Date Completed / Date of Review Discussion:

Instructions for Expert Reviewer:

Thank you so much for agreeing to review this survey. We are developing the survey in order to learn more about how frontline healthcare apprentices develop professional identity, healthcare self-efficacy, and persistence intentions in both apprenticeship and the career for which they are apprenticing. We would also like to learn more about how their existing identity and self-efficacy as caregivers may influence the development of these characteristics. We have asked you to assist us because your expertise is valuable as we evaluate the survey content.

Please follow these instructions to complete your review:

1. Review the attached consent form (Informed Consent for Survey Review) and ask Amber any questions you may have. The study was approved with a waiver of documentation of informed consent, so you do not need to sign and send it back.
2. Read about the target population for the survey, the study context, and the definitions of study constructs on the next pages. Note the abbreviations of each construct. The relevant abbreviation(s) will appear in parentheses next to each survey item, so that you will know what construct the item measures. Each item has been adapted from other surveys that have already been validated.
3. You can choose to complete the evaluation form below before the discussion on Zoom, or simply read the items in preparation for the discussion. You do not have to come to the discussion with the evaluation form completed, but you may if you wish. If you do wish to complete the form in advance of the discussion, then **evaluate how appropriate each item is for inclusion in the survey. The appropriateness of the item has to do with its comprehensibility, its relevance to the construct it measured, and its suitability for the target audience and study context**. Use the following scale:

   1 = Not appropriate

2 = Somewhat appropriate
3 = Appropriate
4 = Very appropriate

4. Optionally, note down any comments or questions about items. We will discuss all aspects of your review when we meet via Zoom.
5. After you have reviewed the survey, please respond to the items below the survey that ask for information about your experience.
6. Amber Gallup will contact you to set up a Zoom discussion about your review. By attending the pre-arranged meeting, you will be agreeing to participate in the research study. Identifiable information in this cover sheet will be removed prior to saving this file in our database.

Who is the target population for this survey?

This survey will be completed by apprentices who are currently in a registered apprenticeship program for a frontline healthcare occupation. Frontline healthcare workers perform hands-on, essential services in a healthcare setting, typically dealing directly with the public. Frontline healthcare occupations include certified nursing assistant (CNA), emergency medical technician (EMT), licensed vocational nurse (LVA), medical assistant (MA), homecare worker, community health worker, and other occupations that are crucial to public health. Registered apprenticeship programs (RAPs) typically require apprentices to have a high school diploma or to be enrolled in a high school equivalency program, and to have sufficient English fluency to participate in learning experience in English. A registered apprenticeship is fundamentally a job, so apprentices are employed while they study; however, in typical frontline healthcare RAPs, the apprentice does not practice the occupation for which they are apprenticing until they have passed licensing exams at the end of the RAP. Therefore, apprentices are typically employed in an adjacent healthcare role and/or shadow and are carefully supervised by a licensed, experienced mentor. Frontline healthcare workers are a diverse group and tend to differ in socioeconomic status, be somewhat older (Amoyaw & Brown, 2018), and have less time available for education (due to full-time jobs and caring for family members) than university-based students pursuing a baccalaureate degree. Frontline healthcare apprentices may face serious barriers to persistence in their RAP, such as lack of free time, money, transportation, and childcare.

What is the study context?

Apprentices will take the survey online while they are in their apprenticeship courses or outside of work and class hours. A RAP leader or instructor will provide the link via email or via text message.

What are the study constructs?

The survey items are designed to measure eight key constructs. Other survey items frame and contextualize the items and parts of the survey.

Study constructs, definitions, and abbreviations	
(PIP) Professional identity positioned includes the experiences of being in/excluded by others in a specific professional community and role	**(PIB) Professional identity belonging** includes the work to position oneself as belonging in a specific professional community and role
(CIP) Caregiver identity positioned includes the experiences of being in/excluded by others who give or receive care	**(CIB) Caregiver identity belonging** includes the work to position oneself as belonging in a specific community and role as a caregiving person
(HSE) Healthcare professional self-efficacy is the degree to which one feels confident and capable of performing tasks as a professional healthcare provider.	**(CSE) Caregiver self-efficacy** is the degree to which one feels confident and capable of performing caregiving tasks
(LS) Learning supports encompass the various learning experiences and program supports that may be present in RAPs	

(LS-MPS) Mentoring psychosocial includes the socioemotional help that mentees receive from mentors, including encouragement, understanding, counseling, and role modeling	**(LS-MI) Mentoring instrumental** includes the skills-building help that mentees receive from mentors, including coaching, instruction, and assistance with difficult tasks
(IPed) Intent to persist in education focuses on respondents' plans and commitments to continue near-term educational goals	**(IPc) Intent to persist in career** focuses on respondents' plans and commitments to continue longer term career goals

References

Amoyaw, M., & Brown, D. (2018). Apprenticeship America: An idea to reinvent postsecondary skills for the digital age. Third Way.

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
Which best describes your frontline healthcare occupation? (Dropdown menu): Administration (medical transcription, office clerk, medical records, etc. • Direct Care (MA, EMT, Lab Tech, LVN, LPN, CNA, physical therapy technician, etc.) • Community and Public Health (health educator, human services assistant) • Long-term Care (home care, personal card aide) • Mental Health (counselor, psychiatric aide, substance abuse counselor) • Other (occupational therapy assistant, recreational therapist, dietetic technician medical equipment preparer, etc.)						
Please provide the specific occupation you are						

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
apprenticing for. *(constructed response)*						
The items below ask about your experiences and commitment to the frontline healthcare occupation you are apprenticing for. ***7-point scale ranging from very uncertain to very certain.***						
Within the next 5 years, how certain or uncertain are you that you will be working in the specific occupation you listed above?	IPc					
Within the next 5 years, how certain or uncertain are you that you will be working in a healthcare career?	IPc					
What barriers in your life might keep you from continuing in the healthcare occupation you are apprenticing for? *(Constructed response)*	IPc					
At this moment in time, how strong or weak would you say your commitment is to: ***7-point scale ranging from very weak to very strong***						
Staying in the occupation you are apprenticing for?	IPc					
Staying in the healthcare field?	IPc					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
Finish a class project as part of a team.	IPc					
The items below ask about your experiences and commitment to being a caregiver.						
Please describe your experiences as health care recipient or patient. *(Constructed response)*						
How did that experience contribute to your desire to enter the healthcare occupation you are apprenticing for? *(Constructed response)*	CIB/CIP					
How did that experience help you be more confident in your apprenticeship program? *(Constructed response)*	CSE					
Please describe your experiences as a caregiver for a family member or significant other with health conditions. *(Constructed response)*						
How did that experience contribute to your desire to enter the healthcare occupation you are apprenticing for?	CIB/CIP					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
To answer the questions below, please consider the experiences you have had providing care to another person. How true or untrue are the following statements about you? ***7-point scale ranging from very untrue of me to very true of me***						
Being a caregiver is an important part of who I am.	CIB					
Being a caregiver is the most important role I have.	CIB					
It is my responsibility to provide care to my family and friends.	CIB					
Friend and family members turn to me when they have health-related problems or concerns.	CIP					
I have heard from others that I'm a natural caregiver.	CIP					
Others identify me as a caregiver.	CIP					
Providing care to others is part of my role in my family.	CIB/CIP					
I regularly help family members with their problems and concerns.	CIP					
The questions below ask about your confidence that you can do the key competencies related to the frontline healthcare occupation *you are apprenticing for.* For those tasks that are *not* relevant to that occupation, you may indicate this. 7***-point scale ranging from very unconfident to very confident, with an 8th option: "Not relevant to my future occupation."*** How confident are you that you can:						
Help patients and their families navigate the healthcare system?	HSE					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
Record and report important information as needed on the job?	HSE					
Keep patients' personal health information confidential?	HSE					
Communicate effectively with patients and their families?	HSE					
Work well as part of a healthcare team?	HSE					
Show care and understanding to patients and their families?	HSE					
Behave professionally at all times on the job?	HSE					
Maintain appropriate boundaries between myself and patients?	HSE					
Treat all patients as equal?	HSE					
Provide high-quality service or care under pressure?	HSE					
Cope with job-related stress?	HSE					
How has your self-confidence at work changed throughout your apprenticeship program? *(Constructed response)*	HSE					
How has your apprenticeship program helped you become	HSE					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
more confident on the job? *(Constructed response)*						
How have prior experiences caring for others helped you feel more confident in your apprenticeship program? *(Constructed response)*	CSE					
The questions below ask about your confidence as a caregiver in general, not specific to your occupation. 7***-point scale ranging from very unconfident to very confident.*** How confident or unconfident are you that you can:						
Provide appropriate care for another person?	CSE					
Manage to solve difficult care problems if you try hard enough?	CSE					
Deal well with unexpected events related to patient care?	CSE					
Remain calm when facing care difficulties because you can rely on your coping abilities?	CSE					
Find several solutions to a problem relating to caring for another person?	CSE					
Handle whatever comes your way in a caregiving situation?	CSE					
The following questions are about your experiences and commitment to your apprenticeship program. ***7-point scale ranging from very weak to very strong*** At this moment in time, how strong or weak would you say your commitment is to:						

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
Stay in the apprenticeship program?	IPed					
Complete the apprenticeship program?	IPed					
When you think of your friends and family, how disappointed do you think they would be if you quit your apprenticeship? (*7-point scale ranging from very disappointed to not at all disappointed)*	IPed					
How supportive is your family of your participation in apprenticeship, in terms of their encouragement and expectations? (*7-point scale ranging from very unsupportive to very supportive)*	IPed					
What supports help you complete your apprenticeship program? *(Constructed response)*	IPed					
What barriers in your life might keep you from completing your	IPed					

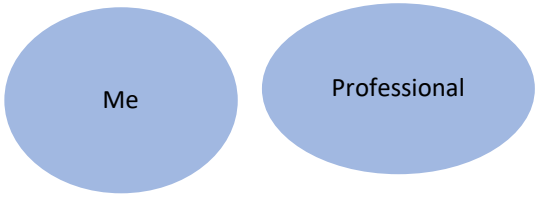
Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
apprenticeship program? *(Constructed response)*						
The questions below ask about the Related Theoretical Instruction (or RTI – the classroom-based portion of your apprenticeship) and its role in your apprenticeship program. ***7-point scale ranging from never to always.*** How rarely or frequently did your RTI include the following:						
Lectures about abstract topics	LS					
Lectures about practical skills	LS					
Reading about topics	LS					
Writing about topics	LS					
Watching videos	LS					
Discussing topics with peers	LS					
Sharing my point of view	LS					
Considering diverse perspectives	LS					
Doing activities with others	LS					
Acting out a scenario	LS					
Reading or discussing a case	LS					
Solving a problem	LS					
Reflecting on what I learned	LS					
Planning to apply what I learned	LS					
During a typical session/class, what percent of time: 4-point scale ranging from 0-25% to 75-100%						
Did the instructor spend talking to the whole class?	LS					
Did apprentices spend working individually?	LS					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
Did apprentices spend working in small groups?	LS					
What helped you learn in your apprenticeship RTI classes? *(Constructed response)*	LS					
What would you change about your RTI classes to help you learn? *(Constructed response)*	LS					
The questions below ask about the mentoring you receive in your apprenticeship program. ***7-point scale ranging from very untrue to very true, with an 8th option: "I do not receive mentoring."*** How true or untrue is each statement below of your mentor(s) in your apprenticeship program?						
My mentor shows me respect.	LS-MPS					
My mentor is understanding about the concerns and feelings I've discussed with them.	LS-MPS					
My mentor encourages me in my work.	LS-MPS					
My mentor serves as a role model for me.	LS-MPS					
My mentor helps me do assignments or prepare for tests that otherwise would have been difficult to complete on my own.	LS-MI					
My mentor provides information to help me understand what I am learning.	LS-MI					

Item	Construct	1 Not Appropriate	2 Somewhat Appropriate	3 Appropriate	4 Very Appropriate	Reasons/Comments/Questions
My mentor helps me improve my job-related skills.	LS-MI					
My mentor helps me solve problems.	LS-MI					
My mentor speaks up for my needs and interests.	LS-MI					
How has your mentor helped you in your apprenticeship program? *(Constructed response)*	LS-MI LS-MPS					
What would you change about how your mentor worked with you? *(Constructed response)*	LS-MI LS-MPS					

The measures below are based on McDonald et al. (2019). They provide information about PIB and CIB, respectively.

Instructions: Please select the picture that best describes the current overlap of the image you have of yourself and the image of a what a healthcare professional is. As you consider the word *professional*, please focus on the career you are apprenticing for.



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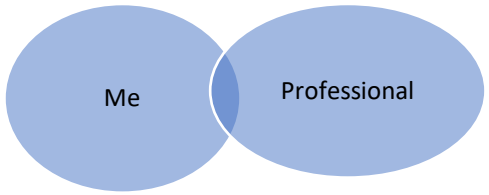

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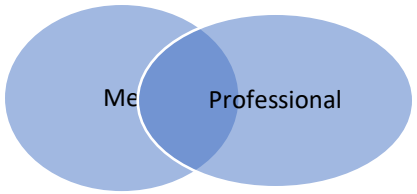
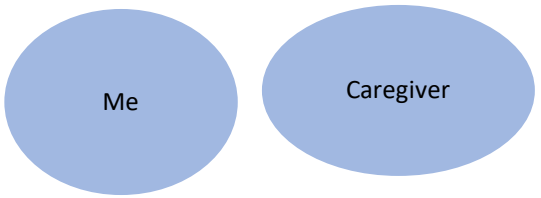


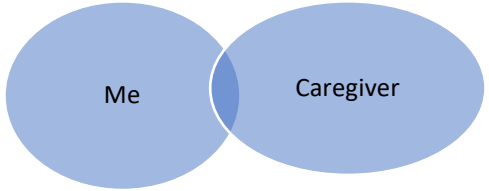
c.

d.

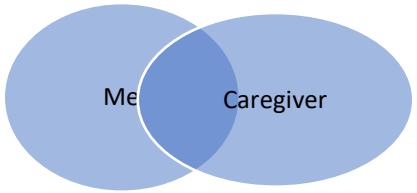
Instructions: Please select the picture that best describes the current overlap of the image you have of yourself and the image of a caregiver. As you consider the word caregiver, please focus on the image of a person who has the heart, skills, and experience to provide care for others.



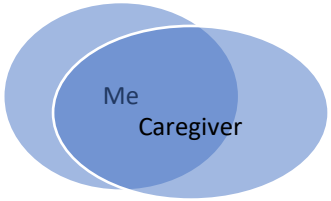
a.



b.



c.



d.

Thank you for evaluating the questions above. Please take a moment to reflect and review your responses, and then answer the questions below about your own experience.

Question 1	What is your experience with apprenticeship?
Question 2	**What is your experience with frontline healthcare?**
Question 3	**What is your experience with adult learning research and/or adult education?**
Question 4	**Is there anything else you would like to share?**

Appendix D: Survey of Transformative Apprenticeship Experiences (STAE)

Study constructs
Healthcare professional identity (HPI) includes the work to position oneself as belonging in a specific professional community and role, as well as the experiences of being in/excluded by others in that community.
Caregiver identity (CI) includes the work to position oneself as belonging in a specific community and role as a caregiving person, as well as the experiences of being in/excluded by others who give or receive care.
Healthcare professional self-efficacy (HSE) is the degree to which one feels confident and capable of performing tasks as a professional healthcare provider.
Caregiver self-efficacy (CSE) is the degree to which one feels confident and capable of performing caregiving tasks.
Learning supports (LS) include traditional (T) and active (A) learning experiences and program supports that may be present in RAPs.
Mentoring (ME) includes the socioemotional and skills-building help that mentees receive from mentors, including encouragement and coaching, understanding, counseling, role modeling, instruction, and assistance with difficult tasks.
Intent to persist (IP) reflects the respondents' plans and commitments to continue educational and career goals.

Item	Response Options	Construct
Are you currently an apprentice in a registered apprenticeship program?	Yes No	
Which best describes your frontline healthcare occupation?	• Administration (medical transcription, office clerk, medical records, etc. • Direct Care (MA, EMT, Lab Tech, LVN, LPN, CNA,	

	physical therapy technician, etc.) • Community and Public Health (health educator, human services assistant) • Long-term Care (home care, personal card aide) • Mental Health (counselor, psychiatric aide, substance abuse counselor)	
Please write the specific occupation you are apprenticing for.	Constructed response	
The questions below ask about the occupation you named above.		
Within the next 5 years, how certain or uncertain are you that you will be:		
working in that occupation?	• Very uncertain • Uncertain • Somewhat uncertain • Neither • Somewhat uncertain • Certain • Very certain	IP
working in any healthcare career?		IP
How true or untrue are the following statements about you?		
Being a healthcare professional is an important part of who I am.	• Very untrue of me • Untrue of me • Somewhat untrue of me • Neither • Somewhat true of me • True of me • Very true of me	HPI
My family and friends see me as a professional in that occupation.		HPI
My co-workers and peers see me as a professional in that occupation.		HPI
How has your apprenticeship program helped you feel like you belong in the occupation you are apprenticing for? Can you share an example?	Constructed response	HPI

The next few questions ask about your confidence that you can do some key competencies related to the frontline healthcare occupation you are apprenticing for. (If a competency is not important for your occupation, click "not relevant.")		
How confident or unconfident are you that you can:		
Communicate effectively with patients and their families?	• Very unconfident • Unconfident • Somewhat unconfident • Neither • Somewhat confident • Confident • Very confident • Not relevant	HSE
Work well as part of a healthcare team?		HSE
Maintain care in high-stress healthcare situations?		HSE
How has your self-confidence at work changed throughout your apprenticeship program? Can you share an example?	Constructed response	HSE
At this moment in time, how strong or weak would you say your commitment is to complete your apprenticeship program?	• Very strong • Strong • Somewhat strong • Neither • Somewhat weak • Weak • Very weak	IP
What might keep you from completing your apprenticeship program?	Constructed response	IP
How supportive or unsupportive is your family of your participation in apprenticeship, in terms of their encouragement and expectations?	• Very unsupportive • Unsupportive • Somewhat unsupportive • Neither • Somewhat supportive • Supportive • Very supportive	IP
What support services offered by your apprenticeship program help you stay in and complete the program?	Constructed response	IP/LS

Have you had any specific past experiences providing care to family members or others that motivated you to enter the occupation you are apprenticing for? Can you share an example?	Constructed response	CI
These questions are about the experience you have had providing care to another person.		
How true or untrue are the following statements about you?		
I have heard from others that I'm a natural caregiver.	• Very untrue of me • Untrue of me • Somewhat untrue of me • Neither • Somewhat true of me • True of me • Very true of me	CI
Being a caregiver sets me apart from others.		CI
Friends and family members turn to me when they have health-related problems or concerns.		CI
The next few questions ask about your confidence as a person who provides care in general, *not* specific to your healthcare occupation.		
How confident or unconfident are you that you can:		
Remain calm when facing stressful care difficulties?	• Very unconfident • Unconfident • Somewhat unconfident • Neither • Somewhat confident • Confident • Very confident • Not relevant	CSE
Solve difficult care problems?		CSE
Deal well with unexpected events in the care of another person?		CSE
How frequently or rarely does your RTI include the following?		
Lectures	• Never • Rarely • Occasionally • Neither • Frequently	LST
Reading about topics		LST
Watching videos		LST
Solving a problem		LSA

Discussing topics in groups	• Very frequently • Always	LSA
Acting out a scenario		LSA
What has helped you learn in your RTI classes?	Constructed response	LS
What would you change about your RTI classes to help you learn?	Constructed response	LS
The new few questions ask about the mentoring you receive in your apprenticeship program. Sometimes, mentors are called "preceptors." For these questions, we are referring to the person who supports you in your on-the-job training. If you have more than one mentor or preceptor, think of the person who mentors you the most. How true or untrue is each statement below of your mentor in the apprenticeship program? (If you do not receive mentoring, check "Not mentored."). My mentor:		
is understanding about the concerns and feelings I've discussed with them.	• Very untrue of me • Untrue of me • Somewhat untrue of me • Neither • Somewhat true of me • True of me • Very true of me • Not mentored	ME
encourages me in my work.		ME
helps me solve problems.		ME
speaks up for my needs and interests.		
How has your mentor helped you in your apprenticeship program? Can you share an example?	Constructed response	ME
What would you change about how your mentor works with you?	Constructed response	ME
The questions below help us understand if programs support all participants to be successful. You may choose to skip any question.		
Did you complete a pre-apprenticeship program?	Yes No	
Which **best** describes you?	• I have completed 6 months or less of my apprenticeship program.	

	• I have completed 7-11 months of my apprenticeship program. • I have completed 1 year to 1 1/2 years of my apprenticeship program. • I have nearly completed my apprenticeship program.
How do you describe your gender identity?	• Female • Male • Transgender Female • Transgender Male • Non-binary • Gender-variant/Non-conforming • Other: _____
With which racial and ethnic groups do you identify? Check all that apply.	• Asian • Black or African American • Hispanic or Latiné/x/a/o • Native American or Alaskan Native • Middle Eastern or North African • Native Hawaiian or other Pacific Islander • White or Caucasian • Other: _____
Growing up, what language(s) were spoken in your household?	• English only • English and another language (or languages) • Another language (or languages) only
Would you describe your current family as:	• Low income • Lower-middle income • Middle income • Upper-middle income

	• High income
What is your age?	• 16-30 years old • 31-45 years old • 46+
What is the highest degree or level of education you have completed?	• Some high school • High school • Some college • Associate's degree • Trade school degree or industry-recognized certificate • Bachelor's degree • Master's degree • Ph.D. or Medical Doctor
Please share any additional thoughts about any of these topics.	Constructed response