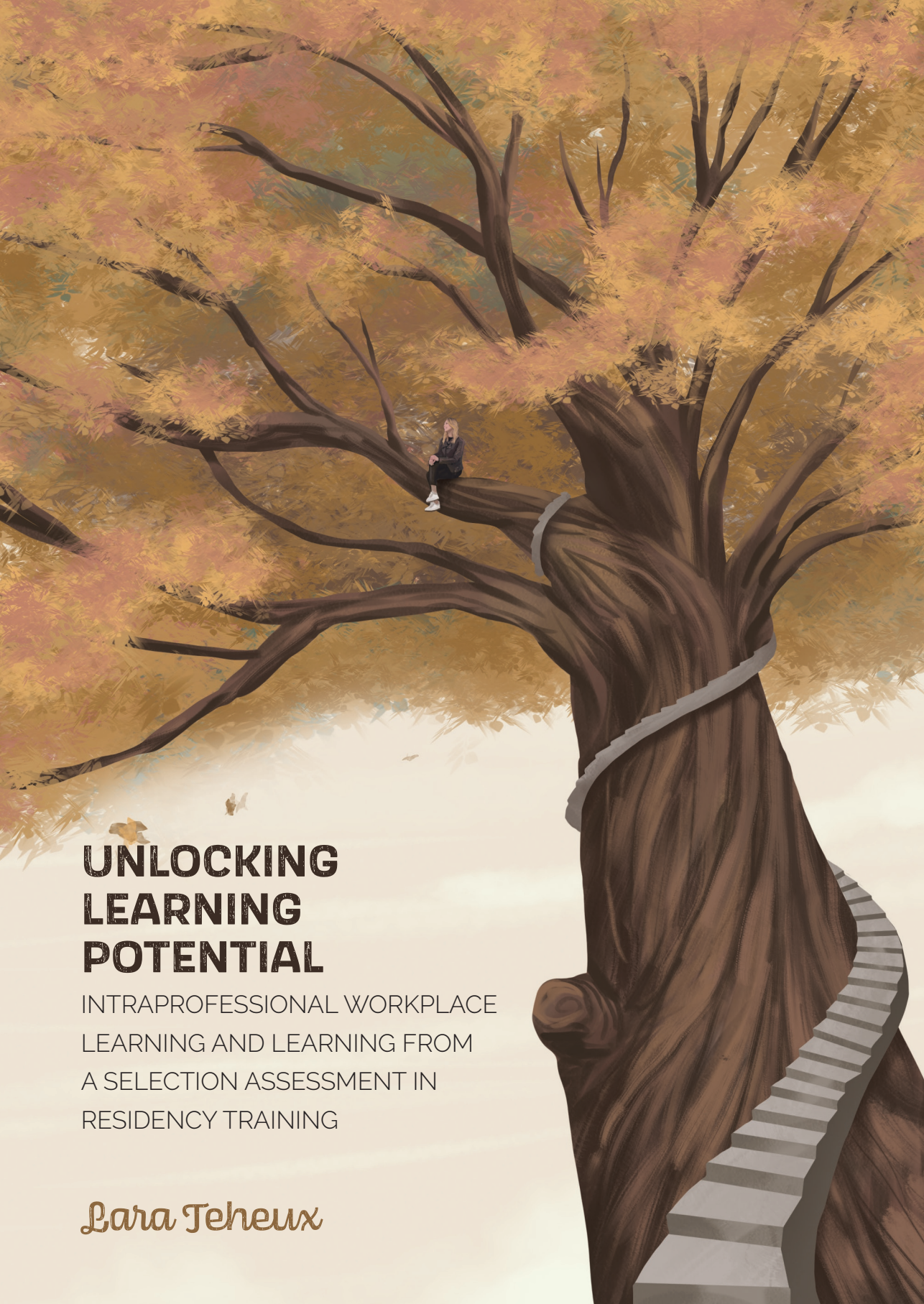

UNLOCKING LEARNING POTENTIAL

INTRAPROFESSIONAL WORKPLACE LEARNING AND LEARNING FROM A SELECTION ASSESSMENT IN RESIDENCY TRAINING

Lara Teheux

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Lara Teheux

Unlocking learning potential
Intraprofessional workplace learning and learning from a selection assessment in residency training

The work presented in this thesis was carried out within the Radboudumc and the Radboudumc Amalia Children's Hospital. The work presented in Chapter 3, 4 and 6 was supported by the Radboudumc innovation fund for postgraduate medical education.

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CHAPTER 1

General introduction

General introduction

The healthcare landscape is undergoing significant changes, characterized by an explosive growth of knowledge and technologies, increasing complexity of health problems, and shifts in societal expectations.[1-4] This results in increased interdependence and puts increasingly high demands on health professionals.[1-3] While these changes are not new, their pace, scale and intensity are unprecedented.[1] To ensure that health professionals are prepared to meet the evolving demands of healthcare, health professions education must adapt accordingly.[1,5] This should encompass providing professionals with relevant knowledge, skills and understandings, as well as support professional identity formation and the development of agency, autonomy and responsibility.[1,5,6]

While acknowledging the common challenges faced by diverse health professions, this thesis centers on physicians. Physicians face notably intensified challenges, characterized by highly complex decision-making, multifaceted roles in patient care, and rapid advancements in medical science.[2] Postgraduate medical education is an especially critical phase in the learning continuum when physicians transition to independent professionals. During postgraduate medical education, residents are faced with new responsibilities and tasks in a highly complex clinical environment.[7-9] This notoriously difficult phase is marked by accelerated development of essential competencies, such as communication skills, teamwork, leadership, and professionalism, and acquisition of specialized expertise, while the resident is also bearing responsibilities in patient care.[7-9] Postgraduate medical education, therefore, plays a pivotal role in educating competent and vital healthcare professionals. These professionals need to be prepared to deliver high-quality patient care, while maintaining their personal wellbeing, and being able to adapt to the complex and everchanging landscape of healthcare.

This PhD thesis aims to contribute to the advancement of postgraduate medical education by addressing two complex challenges. Before delving into a detailed discussion of these challenges, we briefly set the scene by providing an overview:

I. The increasing complexity of healthcare requires health professionals to collaborate effectively across professional boundaries. Effective collaboration is hindered by the siloed organization of healthcare and training programs. **Part I** of this thesis focuses on improving our understanding of intraprofessional workplace learning (i.e., learning from, with and about physicians of different

medical specialties) in postgraduate medical education. We aspire that through our advanced understanding, we will be better equipped to support residents' intraprofessional workplace learning, in order to enhance collaborative practice and ultimately improve the quality of patient care.

II. The increasing complexity of healthcare puts tremendously high demands on health professionals. Health professionals need to continuously self-assess and invest in their professional development to maintain personal wellbeing and to effectively address the evolving needs of patient care. **Part II** of this thesis focuses on improving our understanding of the value of a selection assessment for residents' professional development. We aspire that through our advanced understanding, we will be better equipped to support residents' learning from this assessment, in order to enhance their professional development and ultimately improve the quality of patient care.

Part I: Intraprofessional workplace learning

Healthcare has undergone a significant transformation, characterized by a growing complexity that demands highly specialized knowledge and skills to provide high-quality patient care.[1,4,10,11] This growing complexity has resulted in increasing specialization among health professions.[1,4,10] While the increasing specialization allows for a deeper understanding of specific issues within particular niches, it also means that no single healthcare professional can adequately address all of the multifaceted needs of patients.[4,10] Modern healthcare, therefore, is delivered by teams rather than individual professionals and requires that health professionals from various disciplines collaborate effectively across the boundaries of their professions.[1,11,12] Successful collaborative practice is widely considered to be essential for patient safety.[11,13,14]

In order to achieve successful collaborative practice, health professionals need to be trained across the boundaries of their specialized professions to develop the necessary skills and knowledge to work together seamlessly, ensuring that patients receive high-quality, coordinated care that meets their unique needs.[11,14-16] Learning from, with and about other health professionals has been promoted as an opportunity to inspire innovation, improve collaboration, practice and performance, and to enhance patient safety and patient outcomes.[17] By embedding learning across professional boundaries in postgraduate training, residents can acquire the skills and knowledge needed to collaborate with other health professionals.[4,10,11,14,15] This requires learning to work with other professions (interprofessional collaboration), as well as with other specialties of the same profession (intraprofessional collaboration).[15,16] (Box 1)

Box 1 Definition of interprofessional and intraprofessional learning

Interprofessional learning is the learning that occurs when two or more professions are engaged in learning about, from and with each other to enable effective collaboration and improve health outcomes.[a]

Intraprofessional learning is the learning that occurs when two or more disciplines within the same profession are engaged in learning about, from and with each other to enable effective collaboration and improve health outcomes.[b]

[a,b] Adopted from the WHO[14], the Future of Medical Education in Canada Postgraduate Project[15] and Radboudumc and HAN Raamwerk Interprofessioneel samenwerken, leren en opleiden in de gezondheidszorg[18].

Postgraduate medical education has traditionally been informed by a uni-professional perspective.[15,16,19] Although this traditional, siloed organization of training has its advantages, it may not adequately prepare residents for their role in healthcare teams.[1,4,11,12,14,16,19,20] Through professionalization in residency training, the unique world view and identity of their respective specialties are solidified, allowing physicians to effectively function in their uni-professional team.[10,21] The specialty-specific 'cognitive map' that is created through this process, however, likely imposes barriers to collaboration with other health professionals who do not share the same vocabulary, approaches and understandings.[10,21] The siloed residency training does little to foster an understanding of others' roles, responsibilities, and priorities, which can hinder collaboration among professionals.[1,10,12] Furthermore, it may enforce (implicit) biases about other disciplines, causing individuals to lose interest in understanding their perspective and limiting effective collaboration.[12,17,22] To overcome the shortcomings of siloed postgraduate medical education, it is essential that training curricula start to prioritize inter- and intraprofessional learning to equip residents with the tools needed to effectively collaborate in the healthcare team.[1,14]

The growing recognition that it is crucial to prepare healthcare professionals to work effectively in inter- and intraprofessional teams, has resulted in a surge of interest in interprofessional education.[17,23-38] Intraprofessional learning however, has received far less attention and has thus far been underexplored.[15,16] Although inter- and intraprofessional collaboration and learning may share similarities, there are

certain unique aspects related to the practices within the medical profession and the relationship between physicians of different specialties that merit also giving specific attention to intraprofessional learning.[15,16] Given the central role of intraprofessional collaboration in patient care, intraprofessional learning is not something that should be left to chance; preparing residents for modern medicine requires deliberate, intentional and guided learning across specialty boundaries in clinically relevant learning opportunities.[15,19,20,39] Therefore, research aimed at identifying effective ways to facilitate intraprofessional learning is crucial. This thesis aims to contribute by unraveling intraprofessional learning in the workplace by residents. By improving our understanding of intraprofessional workplace learning, we hope to contribute to advancing effective collaborative practice, with the ultimate goal of enhancing the quality of patient care.

Part II: Learning from a selection assessment

Health professionals work within complex and volatile healthcare environments, demanding them to continuously reassess and renew their competencies to adaptively address novel and complex health challenges.[1,3,40-42] The task of health professions education in preparing health professionals for these tremendous demands is undeniably complex.[1,3] Reflective practice and deliberately seeking avenues for professional development, going beyond the mere accumulation of experiences, are increasingly recognized as indispensable attributes of competent and vital health professionals.[3,5,40-46] This calls for health professions education to offer guidance for learners' professional development and to create pathways that foster reflective practice.[3,5,40,42,44,45] Therefore, it is imperative that postgraduate medical education both offers residents opportunities for professional development and provides guidance in recognizing and capitalizing on these opportunities.

However, in clinical practice, learning by residents often tends to be reactive and implicit, primarily driven by patient care needs, rather than being guided by deliberate learning or reflective practice.[43] The clinical environment can be highly demanding, leaving little perceived space for self-reflection or the pursuit of more long-term developmental objectives.[47,48] Furthermore, studies have illustrated that residents and supervisors are often focused on acquiring medical knowledge and skills, instead of broader facets of professional development such as the cultivation of competencies like professionalism and leadership.[47,48] These challenges underline the need for postgraduate medical education to incorporate structured opportunities for self-reflection and to support residents in their professional development trajectory.

Several methods to foster reflective practice and professional development have been proposed in the literature, including personal development plans, reflective writing exercises, peer groups, individual mentoring or coaching, and developmental portfolio's.[49] A relatively novel method to support reflective practice and professional development in postgraduate medical education involves the use of performance assessments. Performance assessments typically employ multiple instruments, such as personality tests and competency tests, to offer learners with detailed insights into their strengths and areas for improvement that are relevant to their professional practice.[50] While these methods are not entirely novel as they are widely employed for personnel selection, their application in fostering reflective practice and professional development represents a relatively innovative approach in postgraduate medical education.[50,51] Dijkhuizen et al (2018) described the learning value of a performance assessment conducted outside of the selection process as part of four residency training programs (obstetrics and gynecology, internal medicine, orthopedic surgery and radiology).[51] They reported that the assessment encouraged self-reflection and self-awareness, fostered self-confidence and inspired new development goals, underscoring the ability for such instruments to foster meaningful reflection and deliberate learning.[51] Their findings raise the question of whether assessments that are applied in the selection process could similarly facilitate reflection and professional development.

Given the substantial resources invested, both in terms of finances and the efforts of applicants and the training program, harnessing the learning potential of selection assessments is not only relevant but also imperative. Furthermore, it has been argued that training programs utilizing such assessment tools in selection procedures – as with any form of assessment – also bear the responsibility of actively enhancing their educational impact.[52-54] Research investigating learning from these assessment tools when applied in a selection context is currently lacking. Consequently, the understanding of how to support residents' learning from the selection assessments remains limited. Therefore, we set out to explore the learning value of a selection assessment implemented across different selection procedures in the East-Netherlands Region for Postgraduate Medical Training. This selection assessment is a validated tool that measures intelligence, personality, motivational drivers and a set of desirable competencies (© Pi Company). Our aspiration was that through gaining a better understanding of the learning value of this selection assessment, we would obtain valuable insights that enable us to better utilize the learning potential of this assessment for residents' professional development.

The context of this thesis

Workplace learning

Workplace learning assumes a central position within this thesis, given its role as the primary mode of learning during residency training. We adopted a comprehensive perspective on workplace learning, which encompasses incidental and informal learning, which occurs unintentionally through everyday experiences, observations and interactions in the workplace; intentional non-formal learning, which is purposeful but not structured like traditional education; and formal on-the-job and off-the-job training, which involve structured training programs conducted within or outside the workplace, respectively.[55,56] Workplace learning occurs all the time and is an inevitable consequence of engaging in the workplace.[57,58] Nonetheless, we recognize that effective learning may require active engagement and a more deliberate approach.[57-61] This comprehensive perspective on workplace learning allows us to capture the entirety of residents' learning experiences within the workplace environment.

Postgraduate medical education in the Netherlands

The studies in this thesis were conducted in the context of postgraduate medical education - or residency training - in the Netherlands. After medical school, graduates can opt to specialize in a chosen specialty (e.g., pediatrics, surgery, anesthesiology) by following a postgraduate medical training. Since obtaining a position in residency training can be very competitive, most medicine graduates first work for a period as junior doctor not formally in training before being accepted into a residency program. The majority of the training time is spent on workplace learning in clinical settings. During the 4-6 years of medical specialty training, residents rotate through various clinical departments and training sites, including university medical centers and affiliated general hospitals to gain exposure to a wide range of medical conditions, patient populations and settings. Residents' professional development across these rotations is typically monitored through a combination of workplace-based assessments collected in a professional development portfolio and progress meetings with the training program director. Training programs vary in the extent to which they include other strategies to foster the professional development of residents, including features like mentoring, peer groups, and professional coaching.

The Radboudumc Amalia Children's Hospital

The majority of the studies included in this thesis were carried out at the Radboudumc Amalia Children's Hospital. The Radboudumc Amalia Children's Hospital is an academic pediatric care center where in- and outpatient tertiary

care is provided for children with complex medical conditions. The Radboudumc Amalia Children's Hospital accommodates residents from 23 different medical specialties. The nature of residents' training at the Radboudumc Amalia Children's Hospital varies greatly. Some residents spend the entire academic portion of their training there (pediatrics residents), while others rotate for a shorter period (e.g., surgery or neurology residents) or only visit briefly in consultative roles (e.g., ophthalmology or dermatology residents). Although the Radboudumc Amalia Children's Hospital has a unified vision for learning and training, the coordination of residency training programs remains largely separate in the various specialties.

Outline of this thesis

Part I of this thesis (**Chapter 2-4**) focuses on unraveling intraprofessional workplace learning by residents. Our journey to unravel intraprofessional workplace learning started by investigating what was known in the literature. In **Chapter 2**, we present a scoping review to investigate what and how residents learn from workplace-related intraprofessional activities, and what factors influence learning.

In **Chapter 3**, we explore intraprofessional workplace learning in the complex environment of tertiary child care at the Radboudumc Amalia Children's Hospital. In this qualitative interview study, we employed individual and focus group interviews with residents and supervisors from different specialties to explore what intraprofessional learning activities they experience and what factors influence intraprofessional workplace learning in this complex, tertiary care context.

Reflecting upon these two studies, it became evident that, while they offered valuable insights, they did not fully capture the tacit underlying processes at play. To deepen our understanding, in **Chapter 4**, we describe a focused ethnographic study with the aim of illuminating and unraveling the underlying processes that play a role in intraprofessional workplace learning in residency training. This study employed field observations and in-depth interviews with residents from different specialties to investigate intraprofessional workplace learning within the context of everyday practice.

Part II of this thesis (**Chapter 5-6**) focuses on supporting residents' professional development with the intelligence, personality, motivation and competency selection assessment. We started this research endeavor by exploring the perceived learning value at the point of assessment administration. In **Chapter 5**,

we present a qualitative interview study to investigate what learning value pediatric residency applicants derive from the selection assessment, as well as the factors influencing the experienced learning value.

Although this study revealed the potential value of the selection assessment as a learning tool for residents, informal evaluative surveys concluded that, in practice, residents did not utilize the instrument for their professional development as it was not formally embedded in the curriculum. Recognizing this, we hypothesized that enhanced integration in the learning curriculum could benefit the uptake of the selection assessment as a learning instrument. Considering the growing interest in professional coaching in postgraduate medical training, we designed a pilot intervention that entailed coaching residents with the selection assessment. In **Chapter 6**, we explore the perceived value of using the selection assessment for professional coaching in medical postgraduate training, based on individual interviews with residents and a focus group interview with coaches.

An overview of the studies conducted in the light of this PhD thesis is provided in Table 2. In **Chapter 7**, we provide a summarizing discussion of all the studies in this PhD thesis and we discuss implications for practice and future research.

Table 1 Overview of the studies described in this PhD thesis

Chapter	Research question(s)	Design	Data source
2	1) What and how do residents learn from workplace-related intraprofessional activities? 2) What factors influence intraprofessional workplace learning in postgraduate medical training?	Scoping review	Published empirical studies identified through a systematic search strategy
3	1) What intraprofessional learning activities do residents and supervisors experience at the workplace in a tertiary care center? 2) What are the factors that influence intraprofessional workplace learning by residents in a tertiary care center?	Qualitative interview study	Semi-structured individual and focus group interviews with residents and supervisors
4	1) What (underlying) processes occur during intraprofessional workplace learning in residency training?	Focused ethnography	Field observations including artefacts, semi-structured individual interviews with residents
5	1) What learning value do applicants derive from the assessment? 2) What factors influence this experienced learning value?	Qualitative interview study	Semi-structured individual interviews with applicants for the residency program
6	1) What value of using the selection assessment for professional coaching in medical postgraduate training do residents and coaches experience?	Qualitative interview study	Semi-structured individual interviews with residents and focus group interview with coaches

Reflexivity

My motivation for embarking on this PhD journey was rooted in my passion for supporting and fostering personal growth in others and myself. What attracted me in this PhD program was that it offered the perfect combination for me: a chance to make a meaningful impact on the growth of other health professionals in training, ultimately positively impacting the quality of (child) care, while simultaneously offering an opportunity to develop myself as a professional. Throughout my PhD, this inner drive significantly influenced my choices, guiding me towards certain opportunities and research directions. The central goal of improving professional practice played a pivotal role in shaping our research studies. We focused on understanding the complexities of the clinical training environment with the future aim of designing practical interventions that can meaningfully enhance the experiences of healthcare professionals, rather than focusing on building or refining theory.

The studies in this PhD thesis are grounded in a constructivist research paradigm, which views knowledge as socially constructed through interactions.[62] It recognizes the importance of including varied perspectives and experiences, both among the research participants and within the research team, to allow for a more comprehensive understanding of complex phenomena.[62] Our core research team was composed of team members with different academic backgrounds, expertise and experiences, particularly including extensive experience in postgraduate medical training and workplace learning. Throughout the studies, we intentionally fostered discussions from our varied perspectives, facilitating a multifaceted exploration of the phenomena. Furthermore, the respective studies involved additional researchers and stakeholders, bringing various backgrounds, expertise and experiences, further enriching our research processes.

An advantage of being an early career medical doctor is my familiarity with the ins and outs of the clinical work environment. This background allowed me to speak the same language as the health professionals involved in the studies, to more easily understand the experiences of residents, and to establish rapport more effortlessly. Certainly, this was instrumental in obtaining a deeper understanding of their lived experience. However, studying within my own cultural environment presents a challenge in recognizing aspects that I may have taken for granted. The familiarity I have with the setting may have influenced my assumptions and interpretations of certain

phenomena. Engaging in continuous self-reflection and participating in reflective discussions within our research team, which encompassed diverse perspectives, was crucial in recognizing and questioning my own notions and preconceptions. This process was vital in enriching the credibility and confirmability of our findings.

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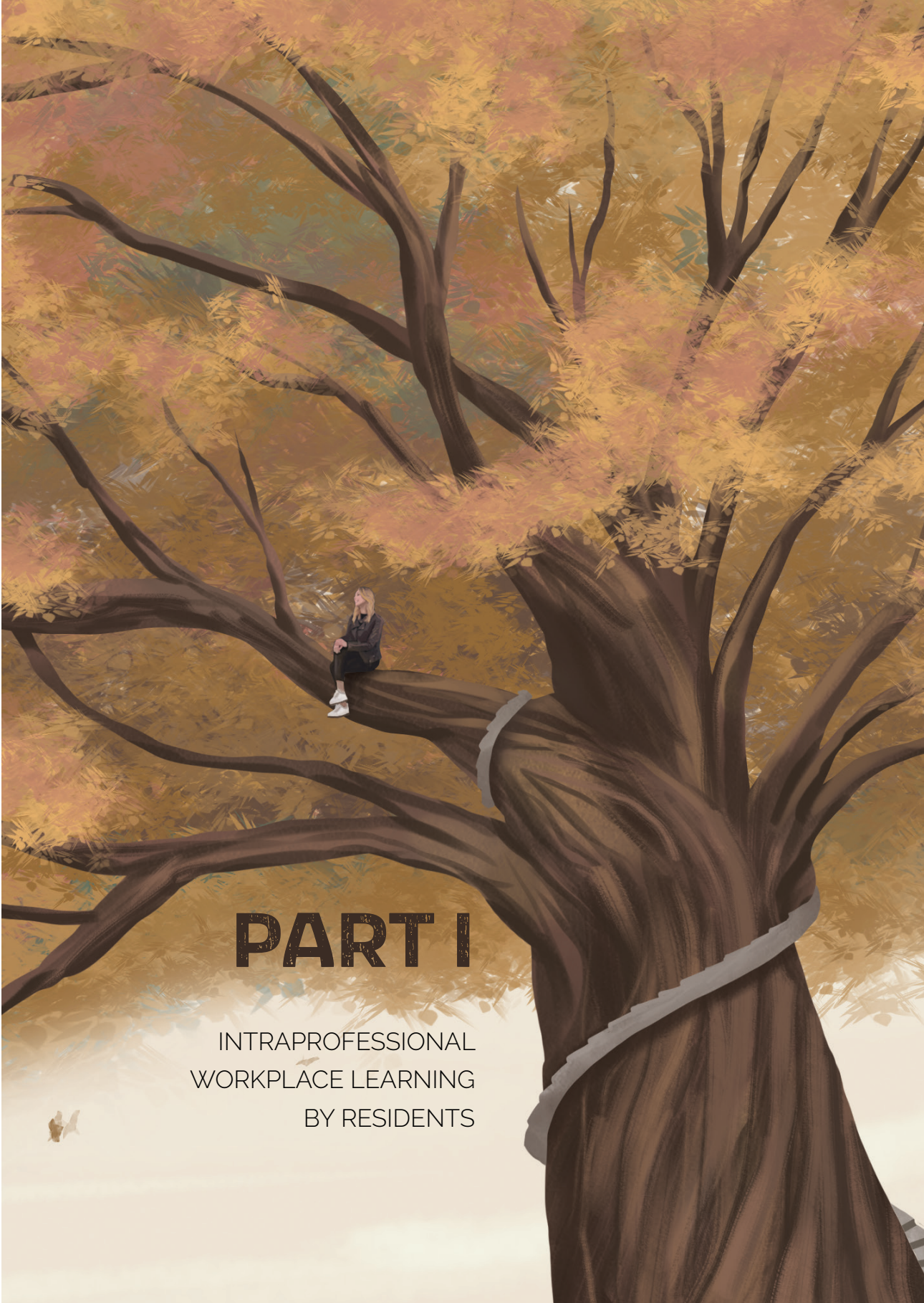

PART I

INTRAPROFESSIONAL
WORKPLACE LEARNING
BY RESIDENTS

CHAPTER 2

Intraprofessional workplace learning in postgraduate medical education: a scoping review

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Abstract

Background

Residents need to be trained across the boundaries of their own specialty to prepare them for collaborative practice. Intraprofessional learning (i.e. between individuals of different disciplines within the same profession) has received little attention in the postgraduate medical education literature, in contrast to the extensive literature on interprofessional learning between individuals of different professions. To address this gap, we performed a scoping review to investigate what and how residents learn from workplace-related intraprofessional activities, and what factors influence learning.

Methods

The PRISMA guidelines were used to conduct a scoping review of empirical studies on intraprofessional workplace learning in postgraduate medical education published between 1 January 2000 to 16 April 2020 in Pubmed, Embase, PsycINFO, ERIC and Web of Science. This study applied 'best fit' framework-based synthesis to map the existing evidence, using the presage-process-product (3P) model developed by Tynjälä (2013).

Results

4330 records were screened, and 37 articles were included. This review identified influencing (presage) factors that derived from the sociocultural environment, learner and learning context. Studies described that complexity of care can both facilitate and hinder learning. Furthermore, intraprofessional learning is threatened by professional stereotyping and negative perceptions, and awareness of learning opportunities and explicit reflection are critical in intraprofessional workplace learning. Studies described a range of informal and formal intraprofessional activities (process) under the headings of collaboration in clinical practice, rotations or placements, formal educational sessions and simulated workplace training. In general, learners responded well and their attitudes and perceptions improved, learners reported increased knowledge and skills and positive behavioral changes (product). Learning outcomes were reported in the domains of patient-centered care, collaborative attitudes and respect, mutual knowledge and understanding, collaborative decision making, communication, leadership, teamwork and reflexivity.

Conclusions

This review gives insight into the high learning potential of intraprofessional activities. Many of the included studies relied on self-reported perceptions of change, therefore, future research should focus on generating more robust evidence including objectively examined outcome measures. This review offers a comprehensive overview of the factors that influence intraprofessional workplace learning in postgraduate medical education. Finally, we provide recommendations for enhancing intraprofessional learning in clinical practice.

Background

Modern patient care is highly complex; the exponential growth of medical knowledge and technological advances result in a high degree of specialization, requiring health professionals from various disciplines to collaborate effectively in order to achieve high-quality patient care.[1-4] Effective interdisciplinary teams improve patient outcomes and reduce costs by diminishing service duplication, unnecessary interventions, and complications.[2,5] Consequently, the need to train residents to work and learn effectively in interdisciplinary teams has received considerable attention in educational policies and accreditation standards.[5-8]

A substantial amount of literature has been published on interprofessional learning, which is defined as the learning that occurs when two or more professions engage.[8] Literature reviews describe that interprofessional education leads to a positive change in attitudes and increased knowledge and skills required for collaborative practice.[9-14] Additionally, the findings from several heterogenous studies suggest that interprofessional education may have a positive effect on patient care outcomes by overcoming communication barriers within medical hierarchy, decreasing tensions, and enhancing understanding of each other's roles and expertise.[12-14] Furthermore, previous research has established an understanding of the multitude of factors that enable or hinder interprofessional learning.[2,10,12,15-18]

Surprisingly, to date little attention has been paid to intraprofessional learning[19] (i.e. the learning that occurs when individuals of two or more disciplines within the same profession engage[8]). While the principles of intra and interprofessional learning are similar at a core level, there are specific differences related to the practices within the medical profession and the relationships between doctors of different specialties and between primary and secondary care doctors, that merit further investigation of intraprofessional learning.[8] In the light of increasing specialization and patient care complexity, intraprofessional learning has become imperative as no one doctor can meet all complex patient care needs, and establishing effective communication between medical specialties — with their own vocabulary, approaches, and understandings — has become increasingly challenging.[2,4,20]

Intraprofessional learning is of particular importance in postgraduate training as discipline-specific 'cognitive maps' (i.e. the whole cognitive and perceptual approach of a discipline, which is a major component of a discipline's culture) are developed and reinforced through the socialization process of educational experiences, and gaining adequate understanding of each other's cognitive maps is an important

challenge in intraprofessional collaboration.[2,4,20,21] Postgraduate training programs often include multiple intraprofessional rotations, during which residents are exposed to the distinct cultures and practices of various specialties, creating a period of high intraprofessional learning potential. On the one hand, the intraprofessional encounters in residency training can create 'productive' tensions in conversation and collaboration between health professionals that can promote learning through experiencing and dealing with differences in cognitive maps, power differentials, pushback and uncertainties.[10,20,22-24] On the other hand, tensions between health professionals may also be 'unproductive' and impair learning as residents may lose the desire to understand the perspective of the other if the tensions are perceived as too unpleasant.[2,22-24] These productive and unproductive tensions first emerge during postgraduate training, as this is the first time that doctors work and learn in separate groups.[2] Therefore, unravelling the process of intraprofessional learning in postgraduate training is of utmost importance to our understanding on how to prepare a "collaborative practice-ready" health workforce.[5]

For these reasons, a generalized overview of the existing literature on intraprofessional learning in postgraduate medical training is overdue. Therefore, we conducted a scoping review. To our knowledge, this is the first review to explore intraprofessional workplace learning in postgraduate medical training. We chose a scoping review approach, as this methodology is particularly helpful in studying literature in research areas with emerging, heterogenous evidence.[25-27] As postgraduate medical training is situated at the workplace,[28] we decided to focus our review on the intraprofessional learning related to the workplace (i.e. the settings where residents work including hospital and community settings). With this scoping review, we aimed to describe and evaluate existing literature in order to advise educational policy makers, program directors and intraprofessional teams on how to enhance intraprofessional learning in the workplace, as well as to identify areas for future research. The following two research questions were formulated: (1) What and how do residents learn from workplace-related intraprofessional activities? (2) What factors influence intraprofessional workplace learning in postgraduate medical training?

Methods

Study design

This study adopted a scoping review approach. The scoping review (or scoping study) is a strategy designed to map literature in a research area, identifying key concepts, sources of evidence, and research gaps.[25-27] We employed the commonly-

used methodology proposed by Arksey and O'Malley[25] and advanced by Levac, Colquhoun and O'Brien[26]. To further ascertain the methodological quality of this review, we employed the PRISMA Extension for Scoping Reviews.[27] The scoping review protocol was registered in the Open Science Framework (https://osf.io/p9xf6).

Selection of studies

The eligibility criteria are summarized in Table 1. We considered workplace learning to encompass incidental and informal learning, intentional non-formal learning, and formal on-the-job and off-the-job training, in order to assimilate the full extent of resident learning related to the workplace environment.[30] We included papers published in peer-reviewed journals with empirical data. We decided to exclude grey literature, as including this would result in an unfeasible number of documents and we felt it would not compromise the answer to the research questions given the breadth of articles represented in peer-reviewed journals. Commentaries, reviews, books, and papers focused on description of curricula were excluded, due to the lack of a research component. Literature published before the year 2000 was excluded; the results from these studies were not considered recent enough as the beginning of the twentieth century marked a reform in health professions education and an increased interest in inter and intraprofessional education.[3,31]

Table 1 Eligibility criteria used in this review

Inclusion criteria	Exclusion criteria
Focus on intraprofessional learning, i.e. the learning that occurs when two or more disciplines of the same profession engage.[8]	Does not meet inclusion criteria of focus on intraprofessional learning, primary and/or secondary care postgraduate medical trainees and workplace learning.
Involves primary and/or secondary care postgraduate medical trainees.[29]	Grey literature.
Workplace learning: incidental and informal, intentional non-formal, and/or formal.[30]	Reviews, commentaries, book, papers only describing curricula (no empirical data).
Contains empirical evidence from qualitative, quantitative or mixed methods studies.	Publication before 2000.
Published in a peer-reviewed journal.	Written in another language than English.
	Unable to retrieve abstract or full-text paper.

We searched 5 electronic databases (PubMed, Embase, PsycINFO, ERIC and Web of Science) using the following Boolean search strategy identified through input from the research team and consultation of the university-affiliated librarian: postgraduate medical education AND intraprofessional AND learning and education and their synonyms. Both subject headings (such as MeSH) and free text terms were applied. Search results were limited by English language and publication date from 2000. A sample search strategy (for PubMed) is provided in Appendix 1. The initial search was performed on April 16, 2020. Search results were collected and deduplicated in Endnote and then exported into Rayyan software[32] for ease of management.

The first author (LT) and a second reviewer (JD, MV or JV) independently screened all article titles and abstracts to determine eligibility for full text review. Discrepancies between reviewers were resolved by discussion and consensus or involvement of a third reviewer. Full texts of all remaining studies were retrieved and eligibility was assessed independently by LT and a second reviewer (EC, JD, WK or JV) based on the same criteria and methods applied in title and abstract screening. Reference lists of reviews and included studies were scanned to supplement the search, using the same methods and criteria.

Data analysis

No methodological quality assessment was performed, as we aimed to map all existing evidence on intraprofessional learning in the workplace in postgraduate medical education and not to present a judgement regarding the 'weight' of evidence.[25]

For the numerical descriptive summary, an initial data extraction chart was drafted collectively by the research team and tested independently by two reviewers (LT and EC or WK) in a random sample of 10 articles.

For the qualitative analysis and synthesis of the evidence, we applied 'best fit' framework-based synthesis, which allows themes that were identified a priori to be specified as coding categories for deductive analysis, and to be combined with de novo concepts following from inductive analysis.[33-35] We chose this method as it allows previously established theoretical frameworks to be explicitly and systematically considered in the analyses rather than generating theories de novo, while also maintaining enough flexibility to inductively detect new themes that emerge from the data. This method is considered especially useful when relevant theories exist but have not been refined in the specific context of the research question.[34,35]

The research team developed the a priori framework based on reflection upon the experiences of the pilot and pre-existing frameworks on inter- and intraprofessional learning and workplace learning in the literature.[3,36-38] The theoretical framework is described below. A list of themes was derived from the theoretical framework and constituted the a priori framework of themes used to code the data from the included studies. The first author (LT) chartered the data and coded all included articles line by line. When relevant data did not fit in any of the a priori themes, additional themes were inductively added after discussion by at least two authors (LT and EC, JD, WK or JV). Regular meetings of the research team during the data analysis facilitated critical discussion of the data. After reviewing all included studies, the research team discussed the data extraction chart and themes, both from the a priori framework and the inductive thematic analysis, to reach consensus on the final themes and framework to be reported.

Theoretical framework

As learning in the workplace is central in postgraduate medical training,[28] we employed Tynjälä's 3-P (presage-process-product) model of workplace learning[36] as an analytical framework to synthesize the data from all the included studies, in order to untangle the complex phenomenon of intraprofessional learning in relation to the sociocultural environment, learner and context factors, learning processes and learning outcomes. Tynjälä regards *presage factors* as the learning context (i.e. relating to work organizations and their features) and the characteristics of individuals who participate in the learning, also recognizing the importance of the learner's interpretation of the presage factors. The *process* component describes the different work activities through which learning processes take place and the *product* component represents the learning outcomes. These three components are attached to the *sociocultural environment*, which reflects the sociocultural context in a wider sense (beyond the specific local context) and encompasses all artefacts of human culture, including the technical-organizational environment. The sociocultural environment is placed as a surrounding frame as it plays a determining role in the *presage, process* and *product* of workplace learning.

In order to gain a more detailed understanding of the diversity of learning outcomes (product) specific to collaborative practice in medical care, we decided to enrich the product section of our analytical framework with the competency frameworks from Janssen et al.[37] and Rogers et al.[38]. These authors defined a number of competencies relevant for collaborative care: 'patient-centered care', 'roles and responsibilities', 'role understanding', 'mutual knowledge and

understanding', 'collaborative attitude and respect', 'interprofessional values', 'communication', 'teamwork', 'leadership', and 'reflexivity'. Lastly, we adopted the four level learning outcome typology originally designed by Kirkpatrick[39] as operationalized in the interprofessional learning continuum (IPLC) model[3]. In this model, learning outcomes are classified in four non-hierarchical levels: learners' reactions (level 1); changes in attitudes or perceptions (level 2a); acquisition of knowledge or skills (level 2b); behavioral change (level 3); and performance in practice (level 4). We felt that this typology would be helpful to facilitate the narrative about the outcome measures used in these studies and to illuminate research gaps, in order to inform policy development and areas for future research.

Research team

The research team was composed of members with diverse backgrounds and experience in postgraduate medical education and educational research: a medical doctor and PhD student in postgraduate education (LT), a senior educational researcher and lecturer in the field of interprofessional education (WK), a senior educational researcher and educationalist (MV), a general practitioner and director of primary care specialty training (NS), and three pediatricians with experience as program director of pediatric specialty training (JD, EC, JV).

Results

Figure 1 displays the PRISMA flow diagram. The electronic database search retrieved 7551 citations, and the reference lists of reviews and included articles provided 146 extra citations. Four thousand three hundred thirty records were screened for eligibility. Finally, we included 37 articles describing 35 unique studies in the review.

The included studies were heterogenous in design. 14 studies employed qualitative methods (38%)[40-53], 13 studies used quantitative methods (35%)[54-66], and 10 studies had a mixed methods approach (27%)[67-76] (see Table 2). Of the quantitative and mixed methods studies, 11 studies[54-56,58,59,61,62,71-74] employed a pre/post-test design. All qualitative studies[40-53] and 6 of the mixed methods studies[67,68,71-73,75] used interviews as one of the methods for data collection, in some studies triangulated with other methods such as observations or document analysis[42,44,52,71].

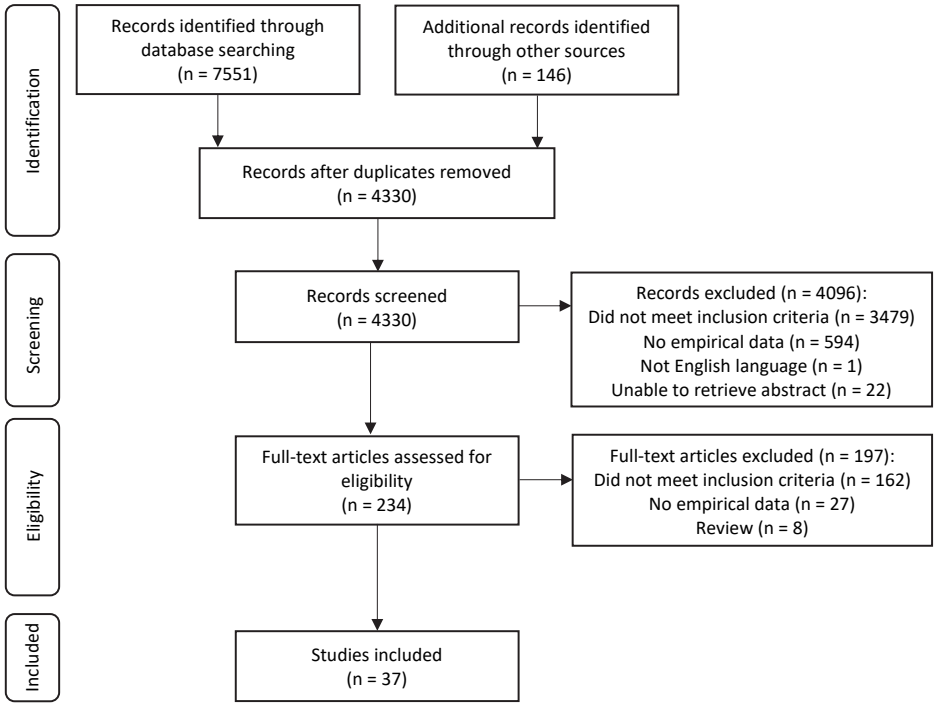

Figure 1 PRISMA flow diagram

A broad range of medical specialties were involved in the intraprofessional activities described in the included studies. The specialties most often involved were internal medicine (n=16)[42,44,46,47,51-54,60,61,65-67,70-72], surgical specialties (n=14)[46,47,49,52,53,56,57,59,63,64,69,71,72,75], pediatrics (n=11)[41,43,45,47,48,50,54,61,68,69,76], family medicine (n=11)[40,41,43,44,46,51,55,58,71-73], emergency medicine (n=10)[42,48,50,52,53,56,59,68,71,72] and geriatrics (n=9)[52,53,55,61,65-67,72,74]. The complete dataset is available in the DANS EASY repository, https://doi.org/10.17026/dans-zb5-2hfg.

Figure 2 presents a summary of our findings in a modified 3-P model.[36] Below we describe the themes found in four main sections: sociocultural environment, presage, process, and product.

Sociocultural environment

Many of the intraprofessional activities described in the included studies were initiated due to influences from the sociocultural environment, such as changes in national or regional policy, training curriculum requirements or availability of a grant (e.g.[61,65-67]). While many of the stimuli from the sociocultural environment

were described as positive influences, Webster et al.[42] provide an insightful account of a policy change that resulted in enhanced focus on efficiency at the emergency department, which came at the expense of learning opportunities for residents and caused tensions between specialties. Furthermore, several studies reported a lack of reimbursement for intraprofessional care activities and a lack of preparedness of the care system for integrated care to be a barrier to intraprofessional collaboration and learning in practice.[40,41,43,44,66,67]

Table 2 Summary of study methodology, learning typology, learning activities and learning outcomes

	Number (percent) of articles	References
Study methodology		
Qualitative	14 (38%)	40-53
Quantitative	13 (35%)	54-66
Mixed methods	10 (27%)	67-76
Learning typology		
Informal/nonformal learning	15 (41%)	40,42,44-49,51-53,58,60,68,70
Formal learning	8 (22%)	56,59,62,64,71,72,74,75
Combination of informal/nonformal and formal learning	10 (27%)	41,43,50,54,55,61,65,69,73,76
Reported learning activities		
Collaboration in clinical practice	14 (38%)	40,42,44-46,49,51-54,57,60,69,70
Consultations	5 (14%)	40,42,51-53
Radiology rounds	2 (5%)	60,70
Combined outpatient clinic	1 (3%)	54
Co-management inpatient ward	1 (3%)	69
Rotations or placements	8 (22%)	48,50,55,58,61,65,68,76
Formal educational sessions or programs	11 (30%)	41,43,56,59,62,64,71-75
Simulated workplace training	4 (11%)	56,64,71,75
Reported learning outcomes		
Level 1: learner reactions	24 (65%)	40,43,46,48,50,51,53-58,60,62,64,65,68-75
Level 2a: changes in attitudes or perceptions	21 (57%)	43,46,48,50,51,55,56,59-62,64,65,68,70-76
Level 2b: acquisition of knowledge or skills	24 (65%)	40,43,46,48,50-52,54-56,58-62,65,68-70,72-76
Level 3: behavioral changes	8 (22%)	43,46,51-53,71-73
Level 4: performance in practice	0 (0%)	

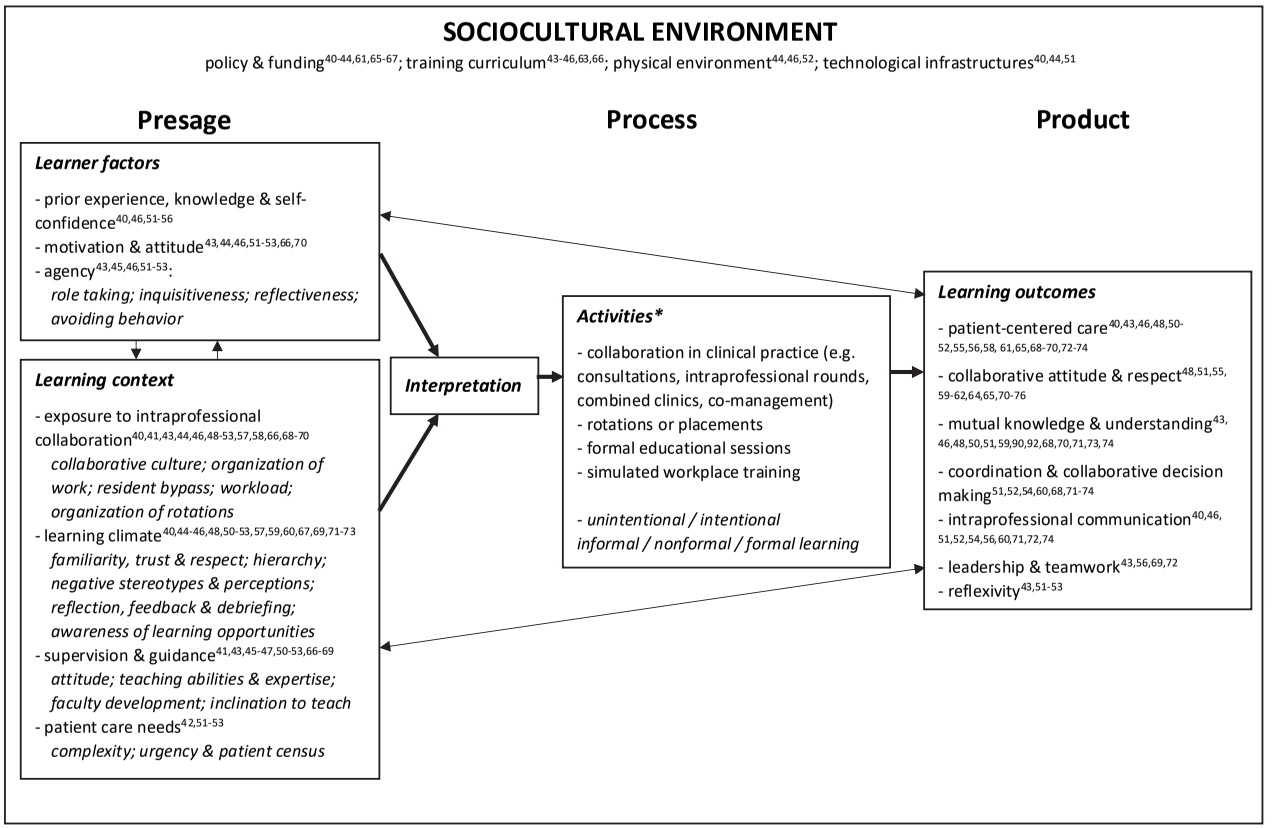

Figure 2 The 3-P model of intraprofessional workplace learning (modified from Tynjälä 2013)

* An overview of the references for process factors is provided in Table 2.

The embedding of intraprofessional learning in training curricula was found to be a key influencing factor.[43-46,63,66] Nevertheless, studies observed that collaboration competencies are not formalized in the training curriculum and learned informally on the job.[44-46] Integration in training curricula is complicated by conflicting time demands with other curricular requirements, significant variability across residency programs and malalignment of competency frameworks, and lack of priority on the academic agenda.[44,46,63,66] Griffin et al.[43] suggest that a lack of interprofessional education in the undergraduate curriculum may make it difficult to adopt the competencies required for integrated care later in the career.

The physical environment is an important determinant of the possibilities and limits of intraprofessional workplace learning.[44,46,52] Specifically to the learning at the interface between primary and secondary care, studies reported that being in physically distant locations resulted in less interaction between primary care trainees and medical specialists.[44,46] Furthermore, hospital size affected learner roles; in smaller hospitals doctors learn more by being responsible and treating patients independently, while in larger hospitals they benefit from highly specialized knowledge from experts but acted less independently in patient care.[52]

Three studies that investigated collaboration between primary and secondary care doctors reported that technological infrastructures (e.g. electronic patient records or referral systems) can facilitate or constrain intraprofessional collaboration and learning.[40,44,51] These challenges were not reported in within-hospital settings.

Presage

Learner factors

Residents' prior experience, knowledge, and self-confidence shape intraprofessional communication and learning.[40,46,51-56] In general, studies described that self-reported learning was greater in trainees with less experience or prior knowledge and that less experienced learners mainly learn through observing, questioning and deliberate teaching by experts, while experienced learners demonstrate more self-directed learning and take more responsibility in patient care.[52-56] Learner insecurity or uncertainty lead to initiation of doctor-to-doctor consultations and more extensive intraprofessional discussion, whereas high self-perceived knowledge resulted in more brief communication and a smaller likelihood of consulting another specialty.[46,51,53] Several studies suggested that the learning from intraprofessional consultations may result in a diminished need for consultations or shifting referral questions.[40,51,53]

Other frequently reported learner factors were motivation and attitude.[43,44,46,51-53,66,70] High learner motivation encourages residents to seek intraprofessional interactions, thereby increasing the learning effect.[51,52] Learning relevant skills for patient care and contributing to high quality patient care are important motivators for intraprofessional collaboration.[43,44,46] Four studies reported that residents were more motivated to learn intraprofessionally with specialties more closely related to their intended specialization.[52,53,66,70]

Factors related to learner agency (i.e. the intentionality and actions of the trainee that mediate learning[77]) were reported in a number of studies investigating intraprofessional activities.[43,45,46,51-53] The level of self-directedness was determined by the role taken by the learner, and learners with an inquisitive nature were more likely to initiate intraprofessional consultations.[43,51,52] Explicit learner reflection was found to be highly valuable for the learning process.[46,52,53] Important triggers for reflection were potential errors and situations in which the views of the learner deviated significantly from the ideas of the expert.[53] One study reported avoiding behavior after conflicts in collaboration,[45] which likely had a negative impact on learning.

Learning context

Exposure to intraprofessional collaboration

A key factor in the learning process was the level of exposure to intraprofessional collaboration. The collaborative culture was one of the determinants of intraprofessional exposure.[40,41,44,51,52,57,68,70] Face-to-face contact was preferred as this contributes to an intraprofessional mindset,[40] whereas limited interaction was found to restrict learning opportunities.[40,41,44,52,57,70] Multiple studies addressed that there was a culture of working separately between specialties, e.g. not including the other specialty in consultations.[40,41,44,57] It was suggested that this may be due to isolation of work settings or a general lack of awareness of the need for collaboration.[44,57]

We found numerous descriptions of how the organization of work influenced residents' exposure to intraprofessional collaboration.[40,44,46,48,50-53,58,66,69,70] A decisive factor was resident task assignment; whether or not trainees have the opportunity to learn in intraprofessional teams (e.g. in the role of requesting or responding doctor in intraprofessional consultations[40,44,46,51-53]) depends on organizational structures, such as who carries the pager for consultations and who is invited to multidisciplinary meetings.[46,52] Furthermore, task assignment may enable exposure to certain patient groups and teaching opportunities with subspecialist faculty.[58,69] Additionally, day-time or night-time shifts also affect exposure to intraprofessional consultations, as in some settings consultations only happen during day-time hours.[46,52]

Exposure to intraprofessional collaboration is threatened by 'resident bypass' in intraprofessional care by supervisors.[49] Reported reasons for resident bypass included lack of resident specialized knowledge, frequent resident transitions, concerns about the quality of communication or inadequate decision making by residents, and the urgent nature of consultations.[49]

Multiple studies reported that high workload or a lack of time was a major barrier to intraprofessional learning, as it diminishes opportunities for direct contact and relationship building, interferes with residents' exposure to intraprofessional activities such as courses, and limits accessibility and availability of supervisors or consultants.[40,43,44,46,48,53,66] Furthermore, the organization of intraprofessional rotations (e.g. selection of suitable patient care activities[58], side-by-side integration of subspecialties[50]) affected exposure and, thereby, intraprofessional learning.

Learning climate

The interaction between specialties plays an important role in establishing the open communication, familiarity, trust and respect that contribute to a fruitful learning climate.[46,50-52,69,71-73] Intraprofessional contact was found to be easier between residents of equal training level as this leads to little experienced hierarchy.[51,71] Studies observed that intraprofessional rotations, consultations, co-management models, and formal training courses could build trust and a sense of belonging,[50,69,72,73] although one study observed that this trust returned to the initial level after three months, suggesting that maintaining contacts is necessary for a long-lasting effect.[73]

Intraprofessional collaboration and learning was hindered by stereotypes and negative perceptions towards the abilities of the other specialty.[40,44,51,57] These obstacles to collaboration and learning were more pronounced in studies investigating learning between primary and secondary care doctors.[40,44,51] Beaulieu et al.[44]reported illustrative examples of stereotyped negative behavior and poor role modelling by supervisors (e.g. advising action without consulting the referring specialty), suggesting that this may be caused by the differentiation of identities between general practitioners and specialists in postgraduate training as supervisors seemed less reflective about their role in intraprofessional collaboration than residents.

Multiple studies addressed that time for reflection and debriefing were highly important for learning.[40,45,50-53,67] Specific to consultations, studies noted that the absence of a feedback mechanism from referrer to consultant (e.g.

on the appropriateness or helpfulness of the advice) was a missed learning opportunity.[40,51] Another reported factor related to the learning climate, was the awareness of intraprofessional learning opportunities.[45,46,48,53,59,60,67,71] Awareness and interest in intraprofessional learning at the workplace was stimulated by formal intraprofessional activities such as courses or placements and could be fostered by labelling learning opportunities and debriefing conflicts.[45,46,48,59,60,71]

Supervision and guidance

Supervisors were described to influence intraprofessional learning in a number of ways. First, supervisors' attitude could facilitate or hinder intraprofessional learning through encouraging or discouraging residents to engage in intraprofessional conversations.[46,51,66]

Second, a number of studies addressed the importance of supervisor's teaching abilities to facilitating resident learning and creating a safe learning environment.[45,47,52,53,67,68] A supervisor's ability to provide intraprofessional guidance depended on their level of expertise and experience, and familiarity with the clinical context of the learner.[47,68] Three studies addressed supervisors' lack of training or knowledge on how to teach collaboration competencies,[41,43,45] stressing the need for faculty development in this area.

Third, side-by-side supervision by experts from different specialties was found to enrich resident learning by providing different perspectives and approaches,[68,69] whereas supervision by a limited number of preceptors specialized in specific areas may limit development in other areas.[50]

Last, studies described that supervisors' inclination to teach residents is dependent on other factors such as workload and time of day.[46,52]

Patient care needs

A number of studies investigating intraprofessional consultations described how patient care needs influenced intraprofessional learning.[42,51-53] Respondents in the included studies indicated that they learned most from complex cases as these required interaction with experts, while less complex care would stimulate more autonomous working and learning.[51-53] Furthermore, studies described that urgency and high patient census negatively impacted learning, as it limited time for self-directed examination, clinical reasoning, and teaching by experts.[42,52]

Process

Studies reported on a range of intraprofessional activities, summarized in Table 2. The majority of studies investigated intraprofessional collaboration in clinical practice in which residents acted in the role of the own specialty.[40,42,44-46,49,51-54,57,60,69,70] Several studies addressed that collaboration competencies are not formally taught, but learned informally in the context of patient care.[44-46] Described learning processes include being responsible for patients in intraprofessional care, questioning and discussion with experts, role modelling, coaching, and feedback.[45,46,53]

A number of studies reported on intraprofessional rotations or placements in which residents acted in the role of another specialty or shadow someone from another specialty.[48,50,55,58,61,65,68,76] The rotations often included a combination of formal educational sessions and informal/nonformal learning. The duration of the rotations varied between three weeks to three months.

The duration of reported workplace-related formal education activities varied between less than one day to numerous sessions in a year-long program.[41,43,56,59,62,64,71-75] See dataset for more details, https://doi.org/10.17026/dans-zb5-2hfg.

Product

Outcome measures

The reported learning outcomes are categorized according to Kirkpatrick's levels[3,39] in Table 2. Level 1 learning outcomes typically addressed participants feedback related to the level of: satisfaction with the activity, appreciation of intraprofessional learning, or usefulness or enjoyment of the activity. In general, this data was obtained through Likert-scale or open-ended survey questions or interviews.

Level 2 learning outcomes were often evaluated using surveys or interviews reporting self-assessment of changes. Knowledge and skills were often assessed in terms of confidence, self-efficacy or level of comfort, and in the majority of studies the applied measures had not been previously validated. An example of a study that gathered more robust data at these levels was reported by Faulk et al.[55], who employed a pre/post-test design to investigate changes in attitudes and knowledge with pre-validated instruments and performed a baseline comparison of knowledge in a control group. Another example is the study by Bullard et al.[71], who gathered attitudinal data in an intervention and control group using a pre/post-test design, triangulated with field observations and interviews, although this study utilized an unvalidated survey.

All of the studies that reported on behavioral change had a qualitative or mixed methods approach. The mixed methods studies describing level 3 outcomes often employed a longer follow-up period than the studies that only reported level 1-2 outcomes.[72,73] All studies that addressed behavioral change mainly drew on self-reported perceptions of change. Four studies also investigated resident behavioral change from the perspective of supervisors.[43,51-53] None of the studies reported learning outcomes on level 4.

The reported learning outcomes will be thematically discussed in the following paragraphs.

Patient-centered care

14 studies (38%) reported positive learning outcomes in the domain of patient-centered care[40,43,46,48,50-52,56,61,68-70,73,74], four studies (11%) reported mixed outcomes (combination of significant positive and non-significant findings)[55,58,65,72], and no studies reported negative outcomes. The majority of these studies described outcomes related to increased confidence in one's ability to provide care for certain patient groups that were shared between specialties, or enhanced knowledge or skills relevant for the care of the shared patient groups[40,46,48,51,52,55,56,58,61,65,68-70,72-74] (level 2b). One study reported a better understanding of the unique needs of older patients and self-assessed improved patient management in clinical practice in the 12-month follow-up after a geriatrics course[72] (level 3). Other reported outcomes included improved attitude[55] (level 2a) and increased confidence in teaching peers[72] (level 2b) regarding specific patient groups.

Often, the learning described in these studies was unidirectional: residents from one specialty would learn knowledge or specific skills from another 'expert' specialty, while no learning by the 'experts' would be reported. A small number of studies did report reciprocal learning in which both specialties would gain a better understanding of the patients.[46,51,70,73]

Two studies reported that an intraprofessional program stimulated patient-centered practice[43,50] (level 2a/3). It is uncertain if these learning outcomes should be attributed to the intraprofessional set-up or to the content of the programs, as the content of these programs was more explicitly focused on patient-centered or integrated care than programs described in the other studies.

Collaborative attitude and respect

14 studies (38%) described a positive change in collaborative attitudes[48,51,59-62,64,70-76], and two studies (5%) described mixed outcomes (combination of significant positive and non-significant findings)[55,65]. Overall, the studies reported improved attitudes towards teamwork, enhanced appreciation and understanding of the importance of collaboration, and increased enjoyment in intraprofessional collaboration.[48,51,55,59,62,71,73,75,76] Additionally, studies found that working relationships improved through development of trust, mutual respect, and enhanced awareness of common goals.[51,59,64,70-73] It should be noted that all of the studies used self-report techniques, none of the studies reported on attitudes as experienced by the other specialty (level 2a).

Mutual knowledge and understanding

We found 14 studies (38%) that described outcomes related to mutual knowledge and understanding[43,46,48,50,51,59,60,62,68,70,71,73,74]; all reported positive outcomes. These studies provided evidence that collaboration in clinical practice (e.g. through consultations and intraprofessional rounds) and intraprofessional rotations helped residents to understand the practice environment, expertise and needs of the other specialty[43,46,48,50,51,59,60,62,68,70,71] (level 2a/b). Other reported outcomes included self-reported increased knowledge on how and when to consult the other specialty, insight into how advice affects the other specialty and better understanding of consultation requests or reports of the other specialty[46,48,51,59,60,62,70,74] (level 2b).

Coordination and collaborative decision making

Nine studies (24%) reported positive outcomes related to coordination and collaborative decision making[51,52,54,60,68,71-74] (level 2a/b and 3). Reported level 2 outcomes included learning procedural knowledge regarding coordination of care, feeling more prepared to communicate patient care needs, and self-reported improved consultation skills.[52,54,60,68,73,74] Four studies reported level 3 outcomes.[51,71-73] Respondents in an interview study indicated that their positive experiences in a consultation program stimulated them to seek collaboration, and supervisors noted that residents learned to take responsibility and act independently.[51] In the 18-month follow-up after a joint program for general practitioner and occupational health trainees, participants reported enhanced awareness of 'the process of cooperation', more initiative to contact each other, better coordinated policy, and a clearer division of tasks in clinical practice.[73] In the mixed methods studies by Bullard et al.[71] and Levine et al.[72], respondents noted that a multidisciplinary course eased interactions and improved residents' 'ability to acknowledge other clinical perspectives' in clinical practice.

Intraprofessional communication

Learning outcomes related to intraprofessional communication were reported in nine studies (24%)[40,46,51,52,54,56,60,71,72,74]; these included feeling more prepared or confident to communicate with other specialties, learning how to articulate consultation requests and reports, and learning how to tailor communication to other specialties (level 2a/b). Improvement of intraprofessional communication in clinical practice was reported in three studies[46,71,72] (level 3); these studies all employed only self-reported perceptions of change.

Leadership and teamwork

Four studies (11%) reported on learning outcomes related to leadership and teamwork skills.[43,56,69,72] Reported outcomes included feeling more prepared for interprofessional teamwork[69] (level 1) and enhanced confidence in leadership and teamwork skills (e.g. leading a resuscitation team, group facilitation, conflict resolution)[56,72] (level 2b). In their interview study, Griffin et al.[43] reported that mentors and trainees felt that an integrated care program enhanced leadership skills in patient care (level 3).

Reflexivity

Four studies (11%) addressed learning outcomes related to reflexivity; intraprofessional interaction was found to stimulate reflection, taking responsibility and being critical about your own questions[43,51-53] (level 3).

Discussion

The aim of this scoping review was to explore what and how residents learn from workplace-based intraprofessional activities, and what factors influence intraprofessional workplace learning. We included 37 articles, which reported on a range of intraprofessional activities and represented a broad spectrum of medical specialties in primary and secondary care.

Learning outcomes

This review identified a multitude of learning outcomes (summarized in Figure 2). In general, learners reacted well to intraprofessional activities, their collaborative attitudes and mutual perceptions improved, and learners gained knowledge and skills necessary for intraprofessional practice. A small number of papers also reported positive changes in behavior in clinical practice.

Many of the included studies described unidirectional learning, especially in situations when residents rotated in another specialty or received formal education from other specialists. This inequality in learning relationships has also been described in the field of interprofessional education by Baker et al.[21]. These authors cautioned that unequal power relationships threaten collaboration and learning and that learning in unequal positions only strengthens unproductive power dynamics. Similar findings were also reported in a recent ethnographic study on intraprofessional learning in hospital rotations for primary care residents.[78] This study observed that primary care residents often adapted the professional identity of the medical specialists and did not express their own professional identity during the rotation, thereby limiting opportunities for the specialist trainees to learn from their expertise in a reciprocal manner. Another possible explanation for the reported unidirectional nature of the learning is that the learning was in fact reciprocal but was not recognized or described as such due to a lack of awareness or a different research focus. Visiting learners often engage in intentionally organized and guided novel learning experiences, whereas the 'experts' interact while engaging in their everyday work. Billett explains that learning occurs through engagement in everyday workplace activities, but this learning is more implicit than in novel situations.[77,79,80] Furthermore, learning is dependent on how individuals elect to participate in work practices and what they construct from that participation, which is likely different between novices and experts.[77,79,80] The complexity of modern patient care results in growing interdependence between health professionals, and overcoming professional silos is necessary for all health professionals dealing with modern care challenges.[1-4,7] It is, therefore, imperative that bidirectional intraprofessional learning of both residents and expert professionals is promoted in order to achieve high-quality, patient-centered care.[7]

It could be argued that the reported positive results were due to the self-reported measures used in the majority of studies. As humans are poor at self-assessment, the actual change may well be less than what was reported.[81] Furthermore, many of the studies included in this review reported on activities with voluntary participation; in several studies the authors noted that this self-selected cohort may be more enthusiastic, which may have contributed to the positive outcomes found in these studies.[43,59,75]

The self-reported nature of these findings does not imply meaningful changes did not occur. It has been well-established that a person's willingness to engage in and sustain self-directed learning efforts depends on their ability beliefs and

motivation.[82-84] Additionally, one's self-perceived accomplishments may also in itself act as a motivator for further learning.[82] The enhanced understanding of the importance of intraprofessional collaboration observed in the included studies suggests some extent of internalization of motivation, which has been strongly associated with behavioral change.[83] For these reasons, the self-reported outcomes described in the included studies do provide valuable insights into intraprofessional learning.

Influencing factors

This review discussed a variety of influencing factors, which are to a large extent consistent with the influencing factors described in the literature on interprofessional learning, e.g. learner experience and enthusiasm, faculty attitudes, workload, stereotypes and negative perceptions, and healthcare and educational policies.[12,15,16] However, some of the influencing factors or aspects reported in this review have not been previously described and may be unique to intraprofessional collaboration and learning.

The findings in this review provide an insight into how high complexity of care can both facilitate and hinder intraprofessional learning. Previous studies emphasized that, whereas tensions in complex care can be highly productive in learning, the conflicts and stress that derive from these tensions may also cause professionals to retreat to their 'safe' professional silos in an attempt to preserve one's self-esteem and dignity.[4,22,85] In line with these studies, our review reveals that complex intraprofessional care was considered to have the highest learning potential,[52,53] whilst one study reported that residents displayed avoiding behavior after experiencing conflicts in care situations.[45] This review sheds new light on the influence of supervisors on this process. Billet highlighted how the pedagogic practices of experienced co-workers (e.g. supervisors) influence the quality of workplace learning experiences through direct guidance of learning and managing access to experiences. Included studies reported that, in complex care situations, supervisors often restricted access for residents by diminishing them to observant roles or even completely bypassing them in intraprofessional communication.[49,52,53] Based on the findings of this review, we argue that ensuring adequate guidance of residents in dealing with complex care situations is of the utmost importance to fully harvest the learning potential of complex intraprofessional care.

Similar to the literature on interprofessional learning,[12,15,16,21,86] we found that intraprofessional collaboration and learning were threatened by professional stereotyping and negative perceptions. The finding that supervisors displayed poor

role modelling behavior, were less reflective in collaboration and expressed more stereotypes than residents corroborates the idea that these intraprofessional biases develop through the socialization processes and professional identity formation in postgraduate training.[2,4,20,21,86] On a positive note, the results of this review suggest that participation in intraprofessional activities contributes to a positive learning climate and leads to improved attitudes. Consistent with the interprofessional learning literature,[12] we found that these positive effects may fade if intraprofessional contacts are not maintained. Taken together, these findings implicate that repeated exposure to intraprofessional activities throughout postgraduate training is necessary to achieve a lasting impact on collaborative attitudes.

Included studies emphasized that awareness of learning opportunities and explicit reflection play a pivotal role in intraprofessional learning. The studies that observed behavioral change often involved individual or team reflection as part of the described activity or through the research methodology. These findings are in agreement with previous research which argued that guided team reflection is essential for collaborative practice and learning.[87,88] The reported lack of faculty development in this area is unsettling, as previous research has established that improperly guided, superficial reflection may only consolidate pre-existing collaboration challenges and reinforce siloed professional identities.[87]

Although there were many similar findings in studies describing intraprofessional activities within the hospital and across hospital boundaries, some of the barriers to intraprofessional learning seemed more prominent at the primary-secondary care interface, including stereotyping, physical distance, technological barriers and malalignment of competency frameworks.[44] It should be noted that these findings are likely context-dependent and therefore probably cannot be extrapolated to all settings, as the organization of primary and secondary care is highly heterogenous throughout the world. Nevertheless, we suggest that better alignment of primary and secondary care residency training curricula will likely enhance intraprofessional learning opportunities for residents during postgraduate training.

Future research

The majority of studies in this review depended on self-reported perceptions of change and only a small number of studies reported on behavioral change or improvements in clinical practice. Several studies reported outcome measures from the perspective of one specialty, not considering the views and experiences of others involved. We suggest that future research should

focus on obtaining more robust data through previously validated tools, more objective behavioral measures and reciprocal measurements. Reeves et al.[89] published guidance on how to improve the quality of studies investigating interprofessional education; we propose that these guidelines are equally suitable for studies investigating intraprofessional learning.

Second, this review found that the available literature does not provide an in-depth understanding of how intraprofessional learning takes place, and what works, for whom, and in which context. Further work is required to understand the mechanisms involved in intraprofessional learning and the interacting relationships between sociocultural environment, presage, process and product factors.

Strengths and limitations

To our knowledge, this is the first review to examine intraprofessional learning in postgraduate medical education. This study provides a comprehensive overview of the learning outcomes and influencing factors reported in intraprofessional learning and provides relevant insights for future research and practice. Another strength of this study is the diversity of backgrounds and expertise in our research team, which included members with extensive experience both in clinical practice and research in postgraduate medical training, workplace learning, and inter and intraprofessional education, and members working in primary and secondary care, which allowed discussion and interpretation of the findings from different perspectives.

A limitation of this scoping review is that we did not perform targeted searches for grey literature for feasibility reasons. Furthermore, the terminology used for intraprofessional learning by authors in the medical education literature is highly heterogenous. Despites our efforts to cover the whole breadth of terminologies in our search strategy, it is possible that we omitted less frequently used terms. Due to these limitations, we might have missed relevant articles. However, given the breadth of methodologies, activities and specialties represented in this review, we believe that our results provide a good map of the learning outcomes and influencing factors of intraprofessional learning in postgraduate medical education. Per the scoping review approach, we did not explicitly aim to assess the quality of studies included, however important methodological limitations regarding self-reported outcomes and other research focus than intraprofessional learning were identified. Finally, we acknowledge that the low number of reported negative outcomes may reflect a publication bias.

Conclusions

This scoping review provides an comprehensive overview of the evidence on intraprofessional workplace learning in postgraduate medical education. These findings support the high learning potential of intraprofessional activities. Moving forward, research should focus on (1) gaining a better understanding of the mechanisms involved in intraprofessional learning and (2) generating more robust evidence with more objective examination of changes in behavior and performance in practice.

This review illuminates the multitude of factors that influence intraprofessional learning in the workplace, which can be used to develop targeted interventions to enhance intraprofessional learning. Building on the practical implications of this study, we present a series of recommendations for educational policy makers, program directors, residents, intraprofessional teams and any other person interested in strengthening intraprofessional learning in clinical practice (Box 1).

Box 1 Recommendations

Individual level

- Encourage residents to set learning goals for intraprofessional practice to enhance awareness of learning.
- Stimulate residents to seek exposure to intraprofessional collaboration and to faculty role models from different specialties to enrich learning by providing intraprofessional perspectives.
- Pay explicit attention to bidirectional learning, especially in intraprofessional rotations. Encourage learners to contribute from their own professional roles in order to stimulate mutual understanding.
- Ensure adequate guidance for residents in complex intraprofessional care, as complex care situations can be highly fruitful for learning, but may also result in conflicts.

Organizational level

- Facilitate resident participation in intraprofessional activities through the practical organization of work, and mitigate resident bypass, in order to ensure sufficient exposure to intraprofessional collaboration
- Integrate time for individual and team reflection in clinical practice, in order to enhance awareness of and guide intraprofessional learning processes. Preferably, this reflection is facilitated by trained professionals.
- Invest in faculty development, to better prepare faculty for their task as intraprofessional preceptor, facilitator, and guide, and to mitigate negative role models.
- Promote fruitful learning climates and address unproductive hierarchy.

Strategic level

- Explicitly integrate and assess intraprofessional collaboration competencies in residency training curricula.
- Ensure repeated exposure in residency training curricula to both formal and informal intraprofessional learning activities, as these seem to have a synergistic effect.
- Align and coordinate residency training curricula of different specialties, especially for closely-related specialties.
- Healthcare policy and funding structures should support intraprofessional learning for collaborative practice.

Availability of data and materials

The datasets generated and analyzed during the current study are available in the DANS EASY repository, https://doi.org/10.17026/dans-zb5-2hfg.

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Appendix 1
Sample search strategy (PubMed)

Postgraduate medical education
"Education, Medical, Graduate"[Mesh] OR Graduate Medical Education [tiab] OR Graduate medical student* [tiab] OR medical graduate student* [tiab] OR postgrad* [tiab] OR post-grad* [tiab] OR resident [tiab] OR residents [tiab] OR residency [tiab] OR residencies [tiab] OR intern [tiab] OR interns [tiab] OR internship* [tiab] OR Specialty train* [tiab] OR specialist train* [tiab] OR specialization train* [tiab] OR trainee* [tiab]

AND

Intraprofessional
"Interprofessional Relations"[Mesh:NoExp] OR "Interdisciplinary Communication" [Mesh] OR Intraprofession* [tiab] OR intradisciplin* [tiab] OR intra-profession* [tiab] OR intra-disciplin* [tiab] OR intersectoral [tiab] OR inter-sectoral [tiab] OR cross-disciplin* [tiab] OR cross-boundar* [tiab] OR boundary crossing [tiab] OR boundaries crossing [tiab] OR cross boundar* [tiab] OR inter-disciplin* [tiab] OR interdisciplin* [tiab] OR interprofession* [tiab] OR inter-profession* [tiab] OR transboundar* [tiab] OR trans-boundar* [tiab]

AND

Learning and education
"Learning"[Mesh:NoExp] OR Learning [tiab] OR learn [tiab] OR learner* [tiab] OR "Education"[Mesh:NoExp] OR "education" [Subheading] OR Education* [tiab] OR training [tiab] OR trainee* [tiab]

Filters
English language
Publication date from 2000/01/01

CHAPTER 3

Learning for doctor-to-doctor collaboration: a qualitative study exploring the experiences of residents and supervisors with intraprofessional workplace learning in complex tertiary care

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Abstract

Background

To deliver high-quality care for individuals with complex medical conditions, residents need to be trained across the boundaries of their specialties. This study aimed to explore learning activities and influencing factors in intraprofessional workplace learning by residents in complex tertiary care.

Methods

This qualitative study was conducted in a tertiary care children's hospital. In September – December 2017, fourteen individual and two focus group interviews were conducted with a purposive sample of residents and supervisors of various specialties. Transcribed interviews were thematically analyzed to describe learning activities and influencing factors that play a role in intraprofessional workplace learning in complex tertiary care settings during residency training.

Results

Respondents described numerous activities that they considered opportunities for intraprofessional learning, both directly and not directly related to patient care. However, deliberate attention to intraprofessional learning often seemed to be lacking in clinical practice. Influencing factors on a system (macro), organization (meso) and personal and interpersonal level (micro) level were identified. Factors on the macro and meso level mainly determined whether intraprofessional learning opportunities arose, while micro level factors mainly influenced whether opportunities were seized.

Conclusions

There are ample opportunities for intraprofessional workplace learning in complex tertiary care for residents. Residents may benefit more from intraprofessional learning opportunities if these are made more intentional and deliberate. Influencing factors at the macro, meso and micro level provide targets for interventions aimed at enhancing intraprofessional workplace learning in postgraduate medical training.

Background

Healthcare professionals are faced with increasingly complex health issues that require professionals from different backgrounds to collaborate effectively in order to provide high-quality patient care.[1,2] The increasing specialization within the medical profession imposes a significant threat to patient care as it may lead to fragmentation in disciplinary silos and ineffective collaboration, which are notorious causes for harmful medical errors.[2-4] Hence, medical trainees need to be trained across the boundaries of their specialties to learn the skills required for collaborative care.[1,5,6] This is of particular importance in complex tertiary care, where care is provided for individuals with highly complex care needs who often require collaborative care from multiple highly specialized health professionals.[7-9]

Gaining an understanding of factors that influence intraprofessional workplace learning (i.e., the learning that occurs when individuals of two or more disciplines within the same profession engage in workplace-related activities[5]) by residents in tertiary care settings is vital towards creating a positive impact on intraprofessional learning and collaboration for complex care. A recent scoping review established intraprofessional learning outcomes and a multitude of factors that influence intraprofessional workplace learning.[10] However, few studies included in this review examined intraprofessional learning in complex tertiary care, and those that did were restricted to the perspective of one specialty or investigated a singular training. None of these studies considered intraprofessional workplace learning in the broader context of the diversity of specialties involved in a tertiary care center. It seems likely that the highly complex nature of care processes in tertiary care brings forth specific opportunities and challenges that warrant further investigation of intraprofessional workplace learning in this context.

Residents need to interact with a diversity of specialties throughout their learning trajectory to become 'collaborative practice-ready' health professionals for complex care.[6,11] Hence, we argue that intraprofessional learning in residency training in tertiary care should not be viewed through the narrow lens of dyadic interaction between specialties, but rather from the broader perspective of the multiple specialties brought together in a tertiary care center. Therefore, unravelling the factors that influence intraprofessional workplace learning in a tertiary care center constitutes a crucial step towards achieving meaningful intraprofessional learning trajectories for complex patient care. This study set out to advance understanding of intraprofessional workplace learning by residents in complex tertiary care, aiming to support the design of meaningful intraprofessional clinical learning

environments. The research questions of this study were: (1) What intraprofessional learning activities do residents and supervisors experience at the workplace in a tertiary care center? and (2) What are the factors that influence intraprofessional workplace learning by residents in a tertiary care center?

Methods

Study design

Starting from a constructivist research paradigm, we designed a qualitative interview study, as a qualitative approach was considered appropriate for exploring the complex dynamics of intraprofessional workplace learning in tertiary care.[12] We aimed to capture common features and influencing factors involved in intraprofessional workplace learning through individual and focus group interviews with residents and supervisors. The reporting of this study was guided by the Standards for Reporting Qualitative Research.[13]

Context

This research was conducted at the Radboudumc Amalia Children's Hospital, a tertiary pediatric care center in the Netherlands where approximately 22,000 children are treated annually. The Radboudumc Amalia Children's Hospital consists of two medium care departments with 48 beds, a short stay medium department with 10 beds, a pediatric intensive care and high care department with 8 beds, a neonatal intensive, high and medium care department with 35 beds, and an outpatient clinic and an emergency department. In the Radboudumc Amalia Children's Hospital, doctors from 23 different specialties work together. Training residents is an integral part of the work environment and residency training programs are coordinated separately for each specialty.

Data collection

This study included a purposive sample of residents and supervisors of various medical specialties. We decided to study intraprofessional workplace learning in postgraduate training from the experience of both residents and supervisors as the dyadic interaction between residents and their supervisors is at the core of postgraduate training.[14] All residents and supervisors from the Radboudumc Amalia Children's Hospital that were not involved in the research project were eligible for participation. Participants were invited for participation by an independent party, namely the secretarial office. A purposive sampling strategy was used to select participants from different surgical, non-surgical and

supportive specialties with varying levels of involvement in complex tertiary child care in order to collect experiences with intraprofessional workplace learning from diverse perspectives (Table 1).[12] Due to the rotation of residents, participants were able to report from a broader range of experiences in various departments.

Table 1 Study participants

Interview	Role	Specialty
Individual Interviews	Residents	Anesthesiology (R1), dermatology (R2), general surgery (R3), otorhinolaryngology (R4), pediatrics (R5), radiology (R6), pathology (R7), urology (R8).
	Supervisors	Intensive care medicine (S1), neurology (S2), ophthalmology (S3), gynecology and obstetrics (S4), neurosurgery (S5), rehabilitation medicine (S6).
Focus group interview 1	Residents	Plastic surgery (R9), oral and maxillofacial surgery (R10).
	Supervisors	Orthopedic surgery (S7), radiology (S8), psychiatry (S9).
Focus group interview 2	Residents	Rehabilitation medicine (R11), human genetics (R12).
	Supervisors	Dermatology (S10), pediatric surgery (S11), pediatrics (S12), emergency medicine (S13), urology (S14).

Semi-structured individual interviews were conducted with eight residents and six supervisors. The interview guide was developed by a project group of educationalists, supervisors and residents and is provided in Appendix 1. Prior to the interview, the phenomenon of intraprofessional learning was explained by the interviewer to ensure a common understanding of this concept.

Next, two focus group interviews with different respondents were conducted to promote data triangulation and to further enrich and deepen the findings from the individual interviews through an interactive discussion between group members. Heterogenic focus groups were purposively formed to stimulate a discussion from different perspectives. The themes from the individual interviews were presented at the beginning of the focus groups and used as a starting point for the discussions. The guiding questions for the focus group interview are provided in Appendix 2. Two moderators led the focus group:

one serving as main moderator who directed the flow of the conversation, and the other as an observer who focused on participants' responses and asking follow-up questions that the main operator might have missed due to their moderating duties.

The interviews and focus groups were conducted by two educationalists who were trained and experienced in qualitative research and conducting interviews and focus groups. The participants and interviewers did not know each other. All interviews were audiotaped, transcribed verbatim and anonymized.

Data collection was ended when the project group established they collected sufficient data to meet the project goals.[15] Data collection was performed September through December 2017.

Data analysis

Data was analyzed using thematic analysis according to Braun and Clarke, following six steps: (1) familiarizing oneself with the dataset, (2) generating initial codes, (3) identifying themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.[16] The data analysis was performed in a research team with diverse backgrounds. Three researchers (JD, EC, JV) were 'insiders' in the institution (i.e., working as medical specialist within the studied clinical learning environment) and, therefore, able to interpret findings from the local sociocultural context. The other three researchers (LT, HW, WK) could act as 'outsiders' and question notions that otherwise might have been taken for granted, such as notions regarding organization of work or collaborative practices. Explicitly reflecting on and discussing our 'insider' and 'outsider' perspectives throughout the research process contributed to the practice of reflexivity. Before analysis, the researchers explicitly formulated and discussed their own assumptions about the studied phenomenon. Keeping a reflective journal and engaging in discussions about personal assumptions in relation to the research data promoted reflexivity and confirmability.

Atlas.ti (v8.4.20) was used to organize the data. In phase one, we familiarized ourselves with the data by reading and rereading the transcripts. In phase two, transcripts from the individual and focus group interviews were coded by two researchers (LT, HW) using an inductive approach. Differences in coding were solved by discussion. A third researcher (JV) was involved in case further discussion was necessary. In phase three, the research team (LT, HW, JD, EC, WK, JV) discussed the codes and categorized them in preliminary (sub)themes.

While reviewing the themes in phase four, the research team felt that clustering the influencing factors in the system (macro), organization (meso), and personal and interpersonal (micro) level would be helpful as an interpretive tool to support educational practice by giving readers an understanding of the factors that could be addressed by the respective parties at each of these levels. Inspired by the framework of "Interprofessional Education for Collaborative Patient-Centred Practice" (IECPCP)[17,18], the research team operationalized the respective levels as follows: macro (system) level factors relate to the wider sociocultural environment and are beyond the direct influence of the organization and its individuals; meso (organizational) level factors relate to the organizational setting, including the organization of the work and learning environment; and micro (personal and interpersonal) level factors relate to the individuals involved and their interactions and relationships. LT and HW reviewed the (sub)themes and underlying codes and data extracts to ensure that the categorization of themes and subthemes was consistent and reflected the essence of the underlying data. In phase five, the research team refined the names of every theme and subtheme to ensure that it captured its underlying essence accurately. Finally, in phase six, the research team conducted a critical review of the manuscript to ensure that the identified themes were accurately represented. This final review process ensured that the manuscript presented a clear and comprehensive account of the study's findings.

Ethical considerations

This research was performed in accordance with the Declaration of Helsinki. The Radboudumc Research Ethics Committee (IRB) approved this study (file number 2020-6284). Participants were informed of their rights, the aims of this study and how their data is protected. Informed consent was obtained from all participants.

Results

This study investigated (1) what intraprofessional workplace learning activities are experienced by residents and supervisors and (2) what factors influence intraprofessional workplace learning. In general, participants expressed a positive attitude towards intraprofessional learning. They considered intraprofessional learning *"educational" (R8)* and *"super interesting" (S3)*, and their experiences with intraprofessional workplace learning as *"valuable" (R6; R7; S9)*. Respondents believed that intraprofessional learning improves medical knowledge and collaboration between specialties and, consequently, patient care.

The results will first address the learning activities experienced by residents and supervisors. Second, the influencing factors on the system (macro), organization (meso) and personal and interpersonal (micro) level will be reported. The results are visually represented in Figure 1.

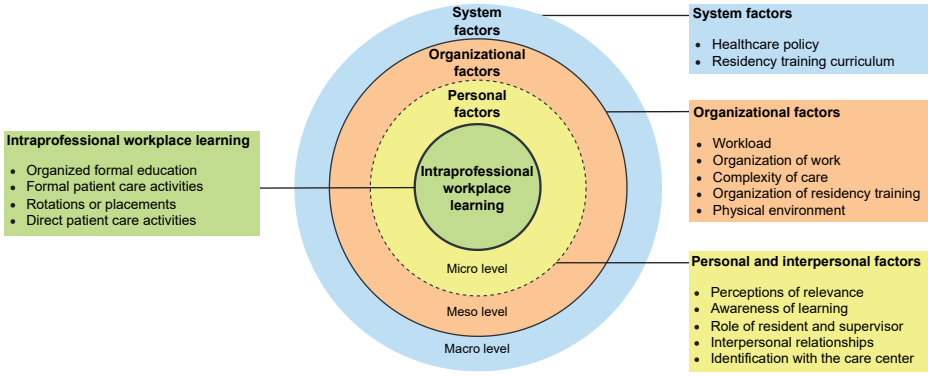

Figure 1 Visual summary of results

Learning activities

Respondents identified intraprofessional learning activities they experienced at the workplace, which we organized in four categories: organized formal education, formal patient care activities, rotations or placements and direct patient care activities (Table 2).

Table 2 Reported learning activities summarized in four main categories

Category	Description
Organized formal education	Organized, formal educational activities involving doctors from two or more specialties. Both attending and delivering formal education were mentioned as learning opportunities.
Formal patient care activities	Formal meetings or activities directly related to patient care, such as multidisciplinary meetings (MDMs) and intraprofessional handovers.
Rotations or placements	Intraprofessional rotations or placements in which the learner participates in or shadows the care activities of another specialty.
Direct patient care	Providing patient care together with someone from another specialty, e.g., shared care on the inpatient wards or in the emergency department, inpatient consultations, or joint consultation hours in the outpatient clinic.

Respondents frequently commented on existing formal educational activities in which residents from two or more specialties were involved, which were organized by one specialty for another or for multiple specialties together. Participants envisioned possibilities to organize new intraprofessional formal education or to exploit already existing uniprofessional education:

> *"You could say, well, if there are some neurological subjects, I will ask the neurology resident to join." (R5)*

Formal patient care activities, such as multidisciplinary meetings (MDMs) were considered valuable intraprofessional learning opportunities, although respondents commented that these could be better utilized by assigning residents a more active role:

> *"The MDMs I attend are predominantly the responsibility of the staff members. [...] That's a shame, because when you prepare for an MDM, you're not only required to immerse yourself in a patient, but also to present your colleagues with everything they want to hear. However, since these MDMs are attended by a relatively small number of residents from other disciplines as well – and when they do attend, they have a seat in second row and only introduce a patient now and then – I absolutely believe that there are serious opportunities to expand on this." (S8)*

Another frequently mentioned learning opportunity was shadowing other specialties or intraprofessional rotations. These were considered highly valuable for both parties, since it provides a better understanding of each other's perspectives and working environment and *"also gives an enormous boost to the relationship between individual specialties" (S8)*. A supervisor emphasized how placements are educational for both parties because *"the exchange that arises is so valuable" (S9)*. Participants suggested that both residents and supervisors should be given more time to shadow other specialties, as this was considered a highly valuable learning opportunity.

Respondents experienced that intraprofessional learning could arise from providing patient care together with someone from another specialty: in the emergency department, in joint consultation hours in the outpatient clinic or in intraprofessional consultations concerning a patient on the ward. Furthermore, examples were given of departments where residents of multiple specialties directly work together, which allowed residents to learn from each other's expertise in the shared patient care:

> *"Ventilation equipment is a piece of cake for anesthesiology residents, but this absolutely doesn't apply to pediatric residents. And then you see that they're training each other at a certain moment." (S1)*

Supervisors argued that intraprofessional learning directly related to patient care in the workplace was more instructive, because *"the way of learning for most doctors is to actually do something" (S9).*

During these activities, residents did not only learn from the perspectives and knowledge of other specialties, but residents also reported learning about intraprofessional care from their own supervisors when discussing or observing intraprofessional collaboration because *"then you start to see how they seek that collaboration" (R12).*

Influencing factors

A multitude of system (macro), organization (meso) and personal and interpersonal (micro) level factors that influence intraprofessional workplace learning in complex tertiary care were derived from the interviews (Figure 1). Overall, factors at the system and organization level mainly seemed to determine whether intraprofessional learning opportunities arose, while personal and interpersonal level factors influenced whether these opportunities were seized.

System factors (macro level)

The learning opportunities to which residents are exposed are influenced by the organization of healthcare, training curricula and workforce planning of residency training. Respondents felt that training curricula seemed to mainly concern their own specialty, instead of crossing boundaries. They suggested that the explicit inclusion of intraprofessional learning in curricula might help secure sufficient time for intraprofessional activities and might stimulate learners and supervisors to seek intraprofessional learning opportunities. For example:

> *"You could make it part of those EPAs. […] That will also stimulate them more: I have to do something with that as well." (S14)*

Organizational factors (meso level)

A frequently recurring barrier was a lack of time and high workload. Respondents argued that intraprofessional learning activities *"[need] to be embedded practically in such a way so that it won't feel as yet another thing we have to do on top of everything else" (R5).* Too much focus on clinical productivity

was considered a barrier, as this resulted in a diminished focus on learning. Furthermore, respondents experienced that learning opportunities were missed due to malalignments in the organization of work between specialist departments, for example due to differences in logistics and planning, and a lack of insight in each other's working schedule.

Although the high volume of patient cases involving multiple specialties in tertiary care was considered a learning opportunity, the high complexity of tertiary care was experienced as a barrier because it hindered residents to actively participate in intraprofessional care:

> *"It's not without reason that patients are discussed during a multidisciplinary meeting. Therefore, it can be very complicated. And there comes a moment when you, as a resident, tune out." (R5)*

> *"Since these are often highly complicated children, the medical specialists often are the ones doing the talking during these meetings." (S6)*

Intraprofessional learning was also influenced by how the residency training was organized at the workplace. Interviewees experienced multiple difficulties specifically related to the organization of intraprofessional formal education, such as logistical challenges, sufficient overlap in subjects and perceived need for comparable knowledge on these subjects beforehand.

An enabling physical environment was an important prerequisite for intraprofessional workplace learning, e.g., enough physical space in consultation rooms. Respondents noted that physical proximity between specialties makes it easier to interact. For example, a shared physicians' room augmented intraprofessional interaction:

> *"It's much easier to find each other for a consultation. You are there, the short lines of communication are there, you know each other better, you talk to each other more easily." (S13)*

Personal and interpersonal factors (micro level)

In order to be open to intraprofessional learning, it seemed crucial that residents and supervisors feel that it is worth their investment:

> *"When you think about intraprofessional training, it is only useful to do it with specialties that are actually involved in the problem." (R4)*

Furthermore, respondents felt that many intraprofessional activities were a learning opportunity but that these were neither recognized nor utilized as such. For example, respondents felt that multidisciplinary meetings were often conducted with a sole focus on medical aspects of patient care and *"could be further elaborated, or … at least be identified more actively as learning moments" (R9).*

Respondents said that what residents learn from intraprofessional learning activities partly depends on the extent to which they have an active role; you learn more *"if you do more things yourself" (S6)* or *"when you bear responsibility for things" (S8).* If residents have an active role depended on both the residents' personal interest and the opportunities to actively participate that they were provided by the organization of work or their supervisors. Multiple reasons for supervisors to bypass residents came forward, including high workload, the perception that it is better for clinical productivity, the high complexity of care, and the fact that some intraprofessional activities are unplanned.

> *"I've noticed that other specialties also don't come with a resident when they visit. […] They simply drop in and ask questions. This is the fastest and easiest way for clinical productivity, naturally." (R1)*

Interpersonal relationships were considered important for intraprofessional workplace learning because participants felt that it was easier to consult someone they knew personally. Peer-contact with residents with a comparable level of experience was considered an especially safe learning environment, because *"it's nice to have someone to spar with about something you both still don't know that much about yet" (R6).* One supervisor mentioned a conflict between two specialties, which was detrimental to their relationship and, consequently, to intraprofessional learning.

Furthermore, the feeling of belonging to the tertiary care center was reported to influence learning; residents who felt less connected to the center expressed less need for intraprofessional activities. Positive experiences during an internship could provide a stronger connection.

Discussion

Intraprofessional learning is vital towards achieving high-quality collaborative care for individuals with complex care needs. In this study, we identified learning activities and factors that influence intraprofessional workplace learning in complex tertiary care from the perspective of residents and clinical supervisors.

Respondents described numerous activities that they considered opportunities for intraprofessional learning. However, when the research team reflected upon the accounts, we noted that during many of these activities no deliberate attention seemed to have been paid to intraprofessional learning, and that intraprofessional learning merely seemed to be a byproduct of clinical care activities. Previous studies have also observed this lack of awareness.[19-21] Although the tacit nature does not exclude the occurrence of meaningful learning,[22-24] learning opportunities are probably best utilized when learning is made more explicit and intentional.[25,26] This improves individual and team performance through feedback, enables transfer of knowledge between individuals, increases accountability and leads to the construction of artefacts that can assist in decision-making and reasoning.[25] Moreover, implicit learning may enforce problematic stereotyping and impede care innovations.[26] Several accounts in the current study reflected a need to make intraprofessional learning more intentional and explicit. Since it can be difficult to learn how to deal with highly complex care challenges without an explicit interactive process of learning with other professionals,[22] we propose that making intraprofessional learning more deliberate could be of particular importance in complex tertiary care.

We found numerous factors that influence intraprofessional workplace learning. Interestingly, macro and meso level factors mainly seemed to determine whether intraprofessional learning opportunities emerged, while micro level factors influenced whether other health professionals provided space for learning and whether learners elected to utilize these opportunities. This finding can be understood through Billet's conceptualization of workplaces as learning environments; participation in workplace learning is constructed through interdependent processes of "workplace affordances" and "learner agency", i.e., the opportunities to participate in learning practices afforded to learners by the workplace and its workers, and learners' agentic behavior.[22]

Surprisingly, despite the interview's focus on individuals' experiences with intraprofessional learning within the clinical environment, respondents frequently commented on influencing factors that were beyond their direct influence and

that of the organization, such as healthcare policy and the national residency training curriculum. This finding highlights that system factors influence affordances within the clinical learning environment.

The influencing factors found in this study are similar to those reported in other studies conducted in other contexts, e.g., system factors, workload, organization of work, interpersonal relationships, motivation, and awareness of learning.[10,19,27-29] Moreover, this study found several factors that seemed particularly relevant to intraprofessional workplace learning in the tertiary care setting.

Previous literature has predominantly depicted complex care as a highly potent avenue for learning where doctors from different specialties interact.[20,30,31] However, the current study shows that too much complexity can be detrimental to residents' learning, because without proper guidance the high complexity could lead to residents becoming disengaged and bypassed by their supervisors. Providing guidance is challenging because it is a continuous balancing act between enabling trainee autonomy and providing support, and it should encompass both the clinical tasks (e.g., observing, giving instructions) as well as the learning process itself (e.g., critical reflection, discussion).[32] Hence, training supervisors may be a key step towards making optimal use of the learning potential of complex intraprofessional care.

Consistent with previous studies, this study illustrates that physical distance and logistics are key factors that determine which specialties interact and how this interaction takes place.[33,34] Therefore, it is advisable to take into account intraprofessional learning when hospital layouts and logistical processes are being designed, so that residents from different specialties can interact at the workplace.

In line with other studies, we found that interpersonal relationships affect intraprofessional learning.[19,29,30,33-35] This study adds to our understanding that a feeling of connectedness to the wider tertiary care center also affects the significance trainees attach to intraprofessional learning.

Implications for practice

The influencing factors reported in this study provide a starting point for targeted interventions that can be taken to enhance intraprofessional workplace learning in complex tertiary care. Table 3 summarizes recommendations for clinical practice derived from our findings.

Table 3 Findings and practical recommendations

Findings from our study	Recommendations for practice
Macro and meso level factors determined whether learning opportunities emerge, while micro level factors influenced whether learning opportunities are utilized.*	Consider both workplace affordances and learner agency[22] in the design of intraprofessional learning environments. Incorporate intraprofessional learning in training and assessment objectives, as this might expand workplace affordances, as well as provide an incentive for deliberate engagement by residents and supervisors.
Healthcare policy and national training curricula influence intraprofessional learning in the clinical environment.	Design healthcare policy and training curricula in collaboration with clinical staff in order to support intraprofessional learning.
Physical distance and logistics determine which specialties interact and how this interaction takes place.	Take into account intraprofessional learning when designing hospital layouts and logistical processes.
Lack of deliberate attention to intraprofessional learning.	Devote explicit attention to learning in existing intraprofessional activities. Allocate time for individual and team reflection on intraprofessional care processes.[36] Train health professionals to facilitate the learning of others.[37]
Too much complexity of care can be detrimental to residents' learning.	Train supervisors how to recognize learning opportunities and how to provide guidance in complex care.[32,37]
Interpersonal relationships and the feeling of connectedness to the care center affect intraprofessional learning.	Foster meaningful intraprofessional relationships to stimulate learner agentic behavior.

* Macro (system) level factors relate to the wider sociocultural environment and are beyond the direct influence of the organization and its individuals; meso (organizational) level factors relate to the organizational setting, including the organization of the work and learning environment; and micro (personal and interpersonal) level factors relate to the individuals involved and their interactions and relationships.

It is our recommendation that both workplace affordances and learner agency should be considered in the design of intraprofessional learning environments. Furthermore, the incorporation of intraprofessional learning in the training and assessment objectives of residency curricula might not only expand workplace affordances, but also provide an incentive for supervisors and residents to

deliberately engage in intraprofessional workplace learning. As macro level factors affect affordances within the clinical learning environment, we recommend that intraprofessional learning should be considered in the design of healthcare policy and training curricula.

The respondents' accounts reflected that in daily clinical practice there is a lack of deliberate attention to intraprofessional learning. We propose that a high priority should be given in particular to efforts aimed at ensuring high-quality guidance in complex care and at making intraprofessional learning a deliberate practice. Potential strategies for this include devoting explicit attention to learning in existing intraprofessional activities such as MDMs, training health professionals to facilitate the learning of others during these activities, and allocating time for individual and team reflection on intraprofessional care processes.[10,26,29,36] Individual and team reflective practice is particularly important when health professionals engage in complex tasks such as in intraprofessional care[36], and it is a skill that requires explicit training of residents and facilitators.[37]

Lastly, this study found that the feeling of connectedness affects how residents feel about learning intraprofessionally. This raises the possibility that agentic behavior could be stimulated through fostering meaningful intraprofessional relationships.

Strengths and limitations

To our knowledge, this is the first study to examine intraprofessional workplace learning from the perspective of the diversity of specialties involved in a tertiary care center. This study included perspectives from both residents and supervisors, and from various medical specialties. Rigor was promoted in this study by data triangulation using individual and focus group interviews, and by stimulating reflexivity in a research group that included insider and outsider perspectives.

While this study has provided valuable insights into residents' and supervisors' experiences with intraprofessional workplace learning and their reasoning based on these experiences, the interviews did not explore participants' lived experience in depth. Furthermore, it is important to acknowledge that interviews are limited with respect to eliciting more tacit aspects. Field research could help elucidate hidden aspects that play a role in intraprofessional workplace learning. Second, the single center nature of this study might limit the transferability of its results. However, considering that the results of this study are consistent with previous studies in different contexts, we consider it probable that the lessons from this study are transferable to other contexts.

Conclusions
Complex tertiary care offers ample opportunities for intraprofessional learning at the workplace, but deliberate attention is often lacking. Influencing factors at the system (macro), organization (meso) and personal and interpersonal (micro) level provide targets for interventions aimed at enhancing intraprofessional workplace learning in residency training for complex medical care.

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Appendix 1
Interview guide individual interview

As you have just read, the Radboudumc Amalia Children's Hospital aims to realize an intraprofessional learning environment for residents that provides residents from various continued medical training programs with joint instruction across the boundaries of their own specialties. We define intraprofessional collaboration as the collaboration between healthcare professionals of two or more disciplines within the same profession, such as pediatricians and surgeons. The two steps in this project are 1) recognizing and acknowledging existing, intraprofessional training occasions, and 2) developing intraprofessional education with a clear link to the workplace.

This interview primarily concerns step one. The questions are aimed at acquiring an insight into the possibilities you see for (the further development of) intraprofessional collaboration and training, and the opportunities and pitfalls you identify concerning this topic.

1. You are familiar with the Amalia Children's Hospital's vision and plans with regard to intraprofessional collaboration, learning and training. How do you feel about this matter?
   What do you find appealing?
   Or what don't you find appealing?

2. What instances of intraprofessional education and collaboration do you observe already in current practice? Both in education as in the workplace.
   What about these is going well?
   What about these requires attention?

3. What value do these intraprofessional training moments and collaboration have for you?
   What positive impact does it have for you/residents?
   What negative consequences does it have for you/residents?

4. What potential additional opportunities for intraprofessional learning do you see in your education that are currently underutilized?
   What are factors that might assist in utilizing these?

5. What ideas do you have to further shape intraprofessional learning and working in practice/in the workplace?
   What are facilitative factors?

6. What barriers do you observe for the further development of intraprofessional education?

7. What barriers do you observe for the further development of intraprofessional working and workplace learning?

8. What advice do you have for the Amalia Hospital that could contribute to the success of intraprofessional collaboration, learning and teaching?
   What are your needs in this respect?

Appendix 2
Guiding questions focus group interview

The researcher briefly presents the themes of the individual interviews about intraprofessional learning in residency training.

What examples stand out positively for you? What is your experience?
What would you like to build upon or explore or apply further?

In what ways could daily work be deployed more emphatically to encourage intraprofessional learning in residents?

What suggestions and experiences do you have to minimalize the impact of the mentioned barriers?
What support can help in this regard?

CHAPTER 4

Unraveling underlying processes in intraprofessional workplace learning in residency

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Abstract

Background

To deliver high-quality collaborative care, residents need to be trained across the boundaries of their medical specialty (intraprofessional learning). The current literature does not provide insights into the underlying processes that influence intraprofessional learning. The aim of this study was to gain insight into the processes that occur during intraprofessional workplace learning in residency training, by exploring everyday intraprofessional interactions experienced by residents, with the ultimate objective of improving collaborative practice.

Method

We conducted a focused ethnography using field observations and in-depth interviews with residents at an academic children's hospital in the Netherlands. In 2022, nine residents from four different medical specialties were shadowed and/or interviewed. In total, >120 hours of observation and ten interviews were conducted. Data collection and analysis were conducted iteratively and discussed in a research team with diverse perspectives, as well as with a sounding board group of stakeholders.

Results

Residents were involved in numerous intraprofessional interactions as part of their daily work. We identified three themes that shed light on the underlying processes that occur during intraprofessional workplace learning: (1) residents' agency, (2) ingroups and outgroups, and (3) communication about intraprofessional collaboration.

Conclusions

Collaborative practice offers many intraprofessional learning opportunities but does not automatically result in learning from, with and about other specialties to improve intraprofessional collaborative care. Overarching the identified themes, we emphasize the pivotal role of the resident-supervisor dyad in facilitating residents' engagement in the learning opportunities of complex intraprofessional care. Furthermore, we propose that promoting deliberate practice and shared responsibility in collaborative care are crucial to better prepare residents for their roles and responsibilities in delivering high-quality collaborative patient care.

Introduction

The healthcare landscape is constantly evolving, with new medical knowledge, treatments and techniques emerging at a rapid pace, leading to a high degree of specialization among medical professionals.[1,2] Therefore, collaboration across disciplinary boundaries in medical care has become increasingly important to provide high-quality patient care.[1-3] This entails both collaboration across different health professions (interprofessional collaboration) and across different specialties in the medical profession (intraprofessional collaboration).[4] Although interprofessional education has received a surge of interest over the past decades, the unique challenges associated with intraprofessional education, e.g. navigating overlapping responsibilities amid differences in cognitive approaches and socialization within various specialty subcultures, have only recently been recognized.[5-7] Residency training remains largely organized within the silos of medical specialties. Although there are benefits to this traditional organization of residency training, it may not adequately equip residents with the knowledge and skills necessary to work effectively in intraprofessional teams.[2,3,5,8-11] Consequently, the need to train residents for collaborative intraprofessional care has become a focus of educational policies and accreditation standards.[4,10,12,13] Because residency training is situated at the clinical workplace, intraprofessional collaboration is predominantly learned through interactions with other specialties that are integral to daily clinical practice.[4,14-16] However, for the practical implementation, uncertainty remains on how to foster intraprofessional learning by residents through these everyday intraprofessional interactions.[4,9,15,17]

Previous research established potential learning activities, learning outcomes and a multitude of factors related to the sociocultural environment, the learning context, and the learners that influence intraprofessional workplace learning by residents.[6,18,19] However, the interrelationships between these factors and the underlying processes that underpin intraprofessional learning through the identified learning activities are not fully understood.[6] Although an ethnographic study provided insights into intraprofessional learning at the primary-secondary care interface[19], a detailed understanding of the underlying processes involved in intraprofessional learning in the academic hospital setting is still lacking.[6] It is likely that the complex nature of care in the academic setting affects the nature of intraprofessional interactions and might give rise to frictions between specialties. This presents both challenging and enriching opportunities for intraprofessional workplace learning that

merit further examination of intraprofessional learning in this context.[20-22] Gaining a more in-depth understanding of the processes involved in learning through intraprofessional interactions in academic care settings is imperative in order to effectively support intraprofessional workplace learning by residents within the volatile, uncertain, highly complex and ambiguous clinical learning environments of academic care.

We set out to illuminate underlying processes by studying everyday intraprofessional interactions using an ethnographic study design. We decided to study an academic pediatric care setting, because this is where collaboration between multiple medical specialties often is required in order to effectively address the unique, highly complex care needs of children.[23-25] In this study, we aimed to gain insight into the processes that occur during intraprofessional workplace learning in residency training, by exploring intraprofessional interactions experienced by residents in an academic pediatric hospital, with the intention of using these insights to enhance intraprofessional workplace learning for improved collaborative practice.

We conceptualized intraprofessional workplace learning as the learning that occurs when professionals from two or more medical specialties are engaged in learning from, with and about each other in the workplace to enable effective collaborative practice, ultimately to improve health outcomes.[4,6,10] We considered workplace learning to encompass incidental and informal learning, intentional non-formal learning, and formal on-the-job and off-the-job training, in order to capture the full scope of resident learning related to the workplace environment.[26] We acknowledged that learning is an inevitable consequence of engaging in work activities and extends beyond intentional educational experiences, although the learning potential may be better realized through active and intentional engagement.[27,28]

Methods

Starting from a constructivist research paradigm, we designed a focused ethnographic study. Ethnography is a qualitative research methodology in which field observations are often combined with other means of data collection to gather rich, holistic data on how people experience and view the world.[29,30] In contrast to traditional ethnography, focused ethnography explores a specific contextual phenomenon rather than an entire social field.[31,32] Because of its

short and focused nature, extensive background research and preparation is essential.[31,32] Therefore, prior to this study, we performed a scoping review[6] and an interview study[22], to identify appropriate study settings, participants and focus topics for data collection.

Reflexivity

The research team consisted of one physician and educational researcher (LT), one senior educational researcher (WK), one educationalist and junior educational researcher (LB), and three medical specialists with experience as a program director (JD, EC and JV). Throughout the research process, the researchers critically reflected on how their diverse backgrounds and experiences brought forth various perspectives and biases that may inform and affect the research, including how their own perspectives on workplace learning and intraprofessional learning shaped the research. This was accomplished through reflective discussions and journaling, which promoted reflexivity and intersubjectivity.[31,33]

We consulted a sounding board group to challenge and give meaning to our findings and underlying assumptions, which further contributed to the practice of reflexivity. The sounding board consisted of four patients or parents of patients, two residents, two residency program directors, and two educational researchers with a background in anthropology and philosophy respectively.

Setting and participants

This research was conducted at the Radboudumc Amalia Children's Hospital, an academic pediatric care center in the Netherlands. In the Netherlands, postgraduate medical training programs typically last four to six years, and take place across academic and affiliated training hospitals. The primary way of learning is workplace learning.

In the Radboudumc Amalia Children's Hospital, physicians from 23 different specialties work together, and training residents is an integral part of the work environment. We aimed to study intraprofessional workplace learning from the lived experience of the resident, by shadowing residents in their daily work. Drawing on input from the sounding board group, we included a purposive sample of residents based on diversity in settings (acute and non-acute care, surgical and non-surgical), medical specialties, and years of training.

Data collection

In this study, we conducted field observations and in-depth interviews to explore processes that occurred during intraprofessional workplace learning. The first author (LT) collected all data to enable trust building with participants and a deeper *immersion*, thereby creating a rich understanding that assisted in recognizing the subtle differences between observed situations.[33]

LT shadowed each resident during a period of one or two days with a one-to-three-day interval. The topic list supporting the field observations was based on previous research[6,22] and consultation of the sounding board group (see Appendix 1). During the observations, LT took brief notes and occasionally asked clarifying questions to understand observed behavior and to capture participants' spontaneous reactions.[33] Additionally, she collected artefacts (e.g., protocols) of potential relevance for the observed interactions. Immediately following each observation day, she wrote detailed field notes and reflective and analytic memos to create *thick description*.[32,34] Subsequently, LT and LB and at least one other researcher (WK, JD, EC, JV) read and reread the field notes and reflected on relevant text fragments to inform the interviews. This process substantially contributed to fostering intersubjectivity by prompting in-depth discussion of the data from different perspectives.

We used in-depth, semi-structured interviews to gain insight into participants' perspectives on observed situations and to explore non-observable aspects, such as cognitions and feelings. In order to gain additional perspectives, we invited other residents who interacted closely with the shadowed resident to participate in a separate interview. We drafted a general interview guide based on previous research[6,22] and input from the sounding board group (see Appendix 2), which was altered to form a personalized interview guide. Interviews, held outside of the workplace, were conducted one to ten days after the observation, to allow time for the research group to reflect and create the personalized interview guide. The interviews were audiotaped and transcribed verbatim.

Data collection techniques were piloted during the first observation period, which involved the participation of an experienced anthropologist from the sounding board group. Using this experience, we refined our data collection techniques. Data collection was stopped when the research group felt that sufficient depth and breadth were reached to answer the research question.[35] All data were collected from February to September 2022.

Data analysis

The iterative data analysis process started alongside data collection and consisted of multiple cycles. All field notes, relevant artefacts and interview transcripts were read, reread and marked by LT and LB and by at least one other researcher (WK, JD, EC, JV). LT and LB open coded all data in Atlas.ti in a constant comparative manner. Data of the second and third observation period were coded independently, followed by a comparison and discussion. Based on this process, we established sufficient agreement to justify coding all remaining data by either LT or LB because of practical feasibility. They iteratively reviewed and discussed codes to challenge interpretations, with involvement of a third researcher (WK, EC, JV) in cases of disagreement or need for further discussion.

After initial open coding, the research team engaged in a creative process of analytic memoing and reflective sessions in order to gain a more comprehensive understanding of the dataset as a whole. During the team discussions, the research team explicitly considered several theories as interpretive tools to guide the study decisions and interpretations, drawing upon the diverse backgrounds, expertise and perspectives on workplace learning that were represented in the research team.[36] For example, when we identified agency as a potential theme, the researchers explicitly considered and discussed different conceptualizations of agency and compared this to the data.[37,38] Through this process, we identified patterns and themes and naïve (sub)categories, which were used to categorize and reconstruct the initial codes and to perform selective coding (LT,LB). Throughout this process, we iteratively engaged in reflective sessions with the research team and sounding board group to reach consensus on the final themes and patterns reported in this manuscript.

Ethical considerations

This study was approved by the Netherlands Association for Medical Education (NVMO) Ethical Review Board (file number 2021.6.10) and the Radboudumc Research Ethics Committee (file number 2021-13041). Written informed consent was obtained from all participants. Information flyers were distributed to inform other health professionals and patients about the study and their right to decline observer presence. Data were pseudonymized prior to data analysis.

Results

We documented over 120 hours of field observations and ten in-depth interviews. We shadowed seven residents from four different specialties (anesthesiology, neurology, pediatrics, surgery) working in six different settings (general pediatrics, neonatology (medium/high care and intensive care), pediatric intensive care, pediatric neurology, pediatric surgery). One resident was shadowed on two separate occasions in two neonatal (medium/high care and intensive care) settings, because this resident commented during the first observation days that the interactions in the neonatal medium and high care felt distinctly different from the intensive care. Because of scheduling constraints, the observation had to be divided into two separate occasions with a 1.5-month interval, resulting in the resident being interviewed twice to prevent recall bias of the first period. Additionally, we invited four other residents who interacted closely with the shadowed residents for interviews. Two of them accepted (pediatrics), one resident declined and one resident was excluded because of a significantly delayed response. Of the shadowed and/or interviewed residents, three were male and six were female. Residents' mean age was 31 years (range 28-36) and they were in their second to fifth year of residency training.

We observed a diversity of intraprofessional interactions that occurred during the residents' everyday work, including intraprofessional meetings involving two or more specialties, formal educational sessions, intraprofessional consultations, ward rounds, medical procedures, emergency patient care and formal and casual conversations. Despite the frequent occurrence of intraprofessional interactions in daily care, it is noteworthy that during our observations, these interactions rarely occurred in the presence of the patient or caregivers.

When reflecting upon the data within our research team and with the sounding board group, we noted that the interactions we observed seemed to be strongly influenced by the prevailing norms and practices of the clinical environment. Residents seemed to develop an understanding and internalize these norms through observing, engaging in and reflecting on intraprofessional interactions in everyday care. Characterizing was the hierarchical relationship between residents and their supervisors akin to a master-apprentice relationship. Residents predominantly regarded their own specialty supervisors as role models, adopting these norms from them and mimicking their behavior.

These dynamics resonate through the three themes we identified to further deepen our understanding of the processes that occur during intraprofessional workplace learning in residency training: (i) residents' agency, (ii) ingroups and outgroups, and (iii) communication about intraprofessional collaboration.

Residents' agency for intraprofessional learning

We observed that residents participated in intraprofessional interactions at different levels of engagement. When we discussed these observations with the residents during the interviews, we uncovered that residents' behavior was influenced by their subjective perceptions of the workplace norms and practices. Residents' perceptions shaped what restrictions and opportunities they perceived in relation to their engagement in intraprofessional interactions. In particular, the hierarchical relationship with their supervisors played a pivotal role in shaping the residents' perceptions of these restrictions and opportunities, as residents tended to predominantly look to their own supervisors as role models and guides in this regard. In sum, we identified five prerequisites that shaped residents' agency in intraprofessional workplace learning: the resident first needs to *see* the learning opportunity, the resident then needs to *want* to engage, think that they *can* engage, think that they *may* engage, and *dare* to engage.

Seeing intraprofessional learning opportunities

In order to be able to display intentional agentic behavior for intraprofessional learning, residents first need to be aware of learning opportunities at the workplace. During the interviews, residents noted that they only realized in hindsight that certain interactions offered a learning opportunity, as illustrated by the example: Table 1-1. Positive intraprofessional learning experiences could trigger awareness. In some contexts, intraprofessional learning was explicitly stated as a goal in training plans. In daily practice, however, little explicit attention was given to that objective.

Want to engage in intraprofessional learning

Motivation influences the learning opportunities residents seek. Residents expressed that intrinsic interest and perceived relevance determine their motivation to learn from others. In general, residents seemed more focused on learning medical content from others than on learning to collaborate intraprofessionally (Table 1-2). There seemed to be a shared belief that collaboration is not learned intentionally; it is simply *"something you naturally do well or not so well" (Interview R5)*.

Table 1 Supporting examples from field notes and interviews regarding residents' agency

#	Topic	Example from field notes (FN) and interviews (I)
	See	
1	Awareness	FN: The anesthesiology resident is assessing an acutely ill child. The pediatrics resident enters the room, and stands at the foot of the bed and says nothing. The two residents do not interact during the patient assessment. I: Resident: "Perhaps I should have sat down with the pediatrics resident and simply have asked: how would you handle this care and what things would you take into account?" Interviewer: "And why was it that this didn't happen?" Resident: "Because I was busy and I didn't think about it." (P5)
	Want	
2	Motivation	I: "I don't feel that my collaboration with other specialties is going all that bad, so I would say that I don't really feel that urge [to learn how to collaborate]." (R7)
	Can	
3	Mental capacity	I: "Yes, so when things are very busy, I notice that I simply don't have enough room inside my mind to store any information." (R6) I: "The busier it gets, the more we start to function on our own islands." (R8)
4	Emergent nature	I: "I think that in my entire career so far, I've only had one [recorded feedback] concerning collaboration with other specialists. Yes, because collaborations are often volatile, right? One phone call, a short consult and they stop by for a moment and disappear again." (R4)
	May	
5	Task distribution	I: "It feels different when it's within your range of duties than when it's supernumerary and you have to pursue it more actively." (R1) I: "It's partly your responsibility, but it's definitely also up to the supervisor to determine how much space the resident gets." (R6)
6	Task focus	I: "The first thing you have to take care of is the organization, once you get that done, you can start focusing on the rest." (R4) I: "Patient care takes precedence." (R1)
	Dare	
7	Safety	I: "I do think that when there is more of a light-hearted atmosphere that you also ask things more easily." (R1)

	These data illustrate
	• Neither resident engages in intraprofessional interaction.
	• The resident expresses that this was caused by a lack of awareness, while experiencing high workload.
	• Resident expresses no perceived need to learn to collaborate as they feel confident about their collaboration.
	• Resident expresses a need to have sufficient mental capacity to be able to learn. • High workload hinders intraprofessional interactions and learning.
	• Intraprofessional interactions are volatile.
	• Task distribution affects learning.
	• Supervisors can facilitate or hinder residents' participation.
	• Managing patient care is prioritized over intraprofessional learning.
	• Perceived atmosphere and others' response affect residents' willingness to ask questions.

Can engage in intraprofessional learning

Residents expressed that to be able to learn from intraprofessional interactions, they need to have sufficient 'mental capacity'. Mental capacity was not only affected by the workload, organization of the work, time of day, and complexity of care, but also by personal circumstances and residents' organizational capacity and medical knowledge, which determines the resident's capacity to adapt to the challenge at hand. Under pressure of high workload, residents felt that they were dumping questions on others and working in their own professional silo instead of collaborating and learning together (Table 1-3).

Residents indicated that the emergent nature of daily intraprofessional interactions made it more difficult to consciously steer their learning and to find individuals that could provide credible feedback, as illustrated in Table 1-4.

May engage in intraprofessional learning

The learning opportunities residents were exposed to, were determined by the task distribution. We observed that tasks were often distributed based on how the work was organized, rather than on residents' learning goals. Incidentally, learning goals were discussed when the tasks were being divided, but intraprofessional learning was not explicitly considered at these occasions. We observed that others, especially supervisors, played an important role in facilitating or hindering residents' participation in intraprofessional interactions (Table 1-5). For example, we observed that supervisors often took the lead during complex intraprofessional discussions among supervisors or took over tasks from residents in case of increasing complexity, whereas residents focused primarily on managing daily tasks and less complex cases.

Residents' subjective perception of their own role – whether of a legitimate collaborator or simply that of an organizer – influenced their behavior and what kind of intraprofessional learning opportunities they felt they could seek. There seemed to be a commonly held belief that managing daily patient care should be prioritized over residents' learning. Consequently, under pressure of a high workload, residents focused on managing patient care and elected not to engage in certain learning opportunities, leaving intraprofessional collaboration to be handled by their supervisors (Table 1-6).

Dare to engage in intraprofessional learning

Residents commented that seizing learning opportunities requires certain assertive behavior. The general atmosphere and pace of intraprofessional interactions affected resident's willingness to actively participate. We observed that supervisors seemed to

play an important role in establishing a safe atmosphere and space for learning. For example, some supervisors explicitly created time for questions in intraprofessional meetings, whereas others set a high pace with limited opportunity to slow down. Furthermore, residents expressed that they feel safer to ask questions when they had positive experiences in the past or positive interpersonal relationships (Table 1-7).

Ingroups and outgroups

Throughout our observations, we noticed that the health professionals tended to categorize themselves and their intraprofessional colleagues into distinct ingroups and outgroups, accompanied by specific stereotypes pertaining to these groups. For example, during conversations, other specialties were often referred to as 'them' or 'you' or referred to as a group (e.g., 'the surgeons said …'), whereas individuals from other subspecialties of the same specialty were typically referred to by their first name, 'we', or as part of the team.

Intraprofessional stereotypes

Throughout our observations, intraprofessional stereotyping was abundant: the observed health professionals expressed stereotypes about others but also about their own specialties. Jokes about stereotypes, including self-mockery, were common. Stereotypes we observed included notions about personality traits, work ethics and practices, collaboration and power play of professionals of certain specialties. Examples of stereotyping are provided in Table 2-1. The stereotypes appeared to be deeply rooted and seen as a generally accepted truth:

> *"I believe that anyone who has ever played doctor quickly realizes what kind of persons are in a certain specialty, and then you simply have to deal with it." (Interview R7)*

Residents seemed to identify with the stereotypes associated with their own specialty. When we asked about these perceived intraprofessional differences, residents attributed these to various factors, including socialization during residency training, role modelling by supervisors, differences in work organization and demands, and individuals' preferences for residency programs that align with their own norms and values (Table 2-2). Although stereotypes were frequently expressed and joked about, we did not observe any instances when residents or supervisors critically reflected on these stereotypes or the way in which these affected intraprofessional collaboration and care.

Table 2 Supporting examples from field notes and interviews regarding ingroups and outgroups

#	Topic	Example from field notes (FN) and interviews (I)
	Intraprofessional stereotypes	
1	Stereotyping	FN: The neurology resident tells the pediatrics resident that yesterday, she had to call neurosurgery because they did not put in the correct orders. The pediatrics resident laughs and says "orders don't automatically appear in the [electronic patient file (EPF)]". They laugh together, saying that neurosurgeons don't know how to make orders in the [EPF]. (P2) FN: The surgery resident is showing a medical student how to use a specific plaster. The plaster is marked step 1 and 2. The surgery resident says it is marked that way so surgeons know how to do it, because "we surgeons are stupid". (P7)
2	Cause of intraprofessional differences	I: "I believe that you are likely to opt for a specialty where you feel comfortable with your peers because you share the same norms and values." (R1) I: "I think it is simply a culture in which you 'grow up'." (R5)
	Interacting and learning with in- and outgroups	
3	Interacting with outgroups	FN: We enter the physicians room, where there is a resident from another specialty working in this department already sitting. The observed resident enters and sits on the other side of the room. There is no interaction between the two residents. Later in the day I ask the resident about this situation. The resident says that "everyone is working on their own side" and "this is how it usually goes". The resident acknowledges that it "feels a little bit awkward". (P4) I: "The resident we have now is, well, more of a surgeon in my view. … Yes, that's funny, because it's very different with neurology residents because you realize that you share the same medical [non-surgical] background, which automatically puts you at the same wavelength. … If this [surgical resident] joins me during rounds together with another surgeon, I soon think to myself 'please go get a cup of coffee', because it's nothing more than bantering and just a sense of humor that doesn't quite match." (R9)
4	Learning from intraprofessional differences	I: "What I really enjoyed to see is that they, well, that they simply look at things in an entirely different way. …I probably enjoy that even more, or better, it's more instructive to see that there's another approach than learning purely medical content." (R9) I: "That can be difficult sometimes when you're dealing with a [different] specialty. You notice that you're on a different wavelength. … You can continue to talk about this, but it doesn't get us any further." (R7)

	These data illustrate
	• Residents express stereotypes about the work ethics and practices of other specialties.
	• Self-mockery regarding stereotypes of own specialty. • Resident identifies with stereotype of own specialty.
	• Residents attribute intraprofessional differences to individuals' preference for specialties that align with their norms and values and socialization.
	• Residents from different specialties working in the same setting, but there is no direct interaction.
	• Resident expresses that the interaction with residents from other specialties that are more similar is easier than with residents who are more different.
	• The resident reports seeing a different way of working in another specialty and reports learning from that.
	• The resident considers the difference between specialties too great, and expresses then not wanting to continue the conversation with that specialty.

Interacting and learning with ingroups and outgroups

These intraprofessional perceptions appeared to affect residents' sense of belonging and, consequently, their preferences in terms of the individuals they wished to interact with and who they looked at as role models. In some settings where residents from different specialties worked together, we observed frequent interaction and mutual learning, whereas, as demonstrated in Table 2-3, in other settings involving residents from different specialties, we observed only minimal interaction between residents. Residents reported that they find it easier to interact with specialties they consider similar to their own (e.g., surgical versus non-surgical specialties). Conversely, they were less inclined to interact with specialties that were *"on a different wavelength" (Interview R9)*, particularly when the stereotyped collaborative culture was viewed negatively (Table 2-3). During the interviews, residents commented that exposure to different group dynamics and ways of working could trigger reflection and conversations about their own work ethics and collaboration practices. When these differences were too pronounced, however, residents expressed a lack of interest in learning from one another, because the practices of others did not correspond with how they viewed their own practices (Table 2-4). Hence, residents appeared to mainly look at individuals from their own or closely related specialties as role models. When talking about their team, residents never referred to the intraprofessional care team as a whole, but rather to their own specialty or to the specialty where they were currently carrying out their internships. Overall, residents exhibited a stronger sense of belonging within their own specialty teams and seemed to be more reluctant to interact and learn from perceived divergent specialties.

Communication about intraprofessional collaboration

We observed numerous intraprofessional interactions. Communication between specialties often seemed task-focused and concise: it mainly concerned collecting the findings and viewpoints of each specialty regarding a patient, or assigning tasks and responsibilities. Explicit communication between specialties about intraprofessional collaboration was not common, and when it was observed, this was primarily during formalized debriefing sessions following medical interventions. A resident commented that they observed that collaboration is discussed explicitly only *"when [things] go wrong" (Interview R4)*. In the interviews, residents seemed to simply accept their observations of the collaborative practice as the prevailing norm.

Learning from a unilateral perspective

Residents reported that they adjusted their behavior based on the outcomes of previous intraprofessional interactions – hence learning by *"trial and error"*. Sporadically, residents reflected with their supervisors on intraprofessional collaboration. During our observations, we did not see any instances of reflection with the intraprofessional care team that could support or direct residents' learning from these experiences. Hence, experiential learning seemed to be directed by a unilateral perception of the outcome of the interaction (i.e., the resident's and, incidentally, the own supervisor's evaluation), rather than by a broader perspective from the intraprofessional care team as a whole. Table 3-1 demonstrates how a resident refrained from consulting another specialty due to their unilateral negative perception of a previous interaction's outcome.

Navigating disagreements

We observed that specialties did not always agree with each other's viewpoints regarding patient cases. Residents reported that from the discussions that followed disagreements, they could learn about specialties' different perspectives and working environments, and about how to communicate and reach a common understanding (Table 3-2). During our observations, however, disagreements between specialties were not always explicitly discussed, and the advice of others was sometimes not acted upon without feedback. We observed that supervisors and residents voiced uncertainty about the level of agreement or irritations about the other specialties' advices within their own team, without explicitly discussing this with the other specialties involved (Table 3-3). When no common understanding was reached through discussion, disagreements could lead to intraprofessional conflict. We observed that in conflicts, supervisors and residents tended to use more 'us versus them' language, refer to medical protocols and shift responsibilities to the primary treating specialty, rather than make decisions with the intraprofessional care team as a whole and express a shared responsibility:

> *"Fine if that is what you want, but then it won't be my responsibility if [the outcome is negative]" (Field notes P7)*

We noticed that some residents seemed to dissociate themselves from intraprofessional conflicts, as they considered these to be outside their purview and perceived little potential for learning from such conflicts, as exemplified in Table 3-4.

Table 3 Supporting examples from field notes and interviews regarding communication about intraprofessional collaboration

#	Topic	Example from field notes (FN) and interviews (I)
	Learning from a unilateral perspective	
1	Learning from experience from unilateral perspective	I: "It will happen that you are a junior resident and you other a couple of lab tests because the [other specialty] wants you to. When the patient is surgically discharged, you're left with those lab deviations, and the [other specialty] will say: 'yes, but it's your patient' … and you're left with the bullshit. You do that twice, but not a third time." (R7)
	Navigating disagreements	
2	Learning from disagreements	I: "I think they don't always realize where our expertise lies, and vice versa. …And that's, I believe, also simply a matter of ignorance on both sides. So you only later realize: 'wait, but this is why they think what they think, and why we think what we think'." (R3)
3	Disagreements not discussed	FN: The resident informs the supervisor about the other specialties' evaluation and proposed treatment plan. The supervisor tells the resident he does not agree. This disagreement is not discussed with the other specialty during our field observation. I: Resident: "Yes, that was a difficult one for me, because that's when I thought: but the [other specialty] says this, my supervisor says "no, that's not true at all". And then I think: 'what am I supposed to do?'." (P5)
4	Dissociation from conflicts	I: "Well, when that happened, I mostly thought to myself: pff, how annoying, I don't want to do this at all. … I'm very glad that you can still hide behind your supervisor in a situation like this." (R5)
5	Considerations about addressing disagreements	I: "That's when I feel somewhat out of place; I don't believe that someone like myself, a resident, should be calling an orthopedic specialist and criticize them - because that's the impression people can get." (R3)
6	Supervisor as role model in disagreements	I: "You see how [many supervisors] work with other specialties in a certain way. But, you also learn a great deal from that, I believe, including how you would or would not go about doing certain things. I believe that you use those ingredients and come up with your own way." (R7)

	These data illustrate
	• The resident feels unhappy about the outcome of an intraprofessional consultation. • As a result of this experience, the resident decided not to consult the other specialty in the future.
	• Residents report that through discussion they can learn about different expertise and perspectives.
	• The supervisor disagrees with the other specialty. This is not discussed with the other specialty.
	• The resident is confused and uncertain how to proceed.
	• The resident considers the conflict to be annoying and frustrating and is happy that the supervisor can deal with it.
	• The resident thinks that the disagreement should be addressed at supervisor level and is worried about their reputation.
	• The resident learns from observing how supervisors collaborate intraprofessionally.

Residents take several factors into account when considering if and how to address intraprofessional disagreements, including their level of certainty about the issue; whether they perceive an issue to be within their own area of expertise or within that of another specialty; the importance of the issue for the patient; whether they believe an issue should be addressed at resident or at supervisor level; their interpersonal relationship; the perceived likelihood of a positive outcome; and the potential risk of negative effects on their professional reputation or the risk of causing intraprofessional conflict (Table 3-5). Some residents stressed that everyone should respect others' area of expertise and refrain from interfering with the affairs of other specialties, whereas other residents acknowledged that patient care is a collective endeavor where everyone's input matters.

Through our observations and interviews, we noted that residents appeared to consider their supervisors as role models when it comes to how to navigate intraprofessional interactions (Table 3-6). In some cases, we observed that residents explicitly discussed with their supervisors how to handle intraprofessional disagreements. Often, however, these behaviors were implicitly modeled rather than explicitly discussed. We observed that when supervisors did not resolve disagreements or conflicts, this could leave the resident confused and uncertain how to proceed (Table 3-3).

Discussion

In order to achieve high-quality collaborative patient care, it is crucial that residents learn how to work across the boundaries of their own specialties. This focused ethnographic study provided insight into the processes that occur during intraprofessional learning by residents by studying intraprofessional interactions in an academic pediatric hospital. Our findings illuminate the previously less understood complex interplay between factors related to the learner, the learning context and the sociocultural environment and the learning processes that collectively drive intraprofessional workplace learning among residents. In this paper, we described three themes that provide comprehensive insights into the underlying processes at play, namely the role of residents' agency, ingroups and outgroups and communication about intraprofessional collaboration.

Our findings showed that intraprofessional workplace learning in academic pediatric care tends to be unintentional and reactive[39] instead of a deliberate practice. We observed that residents' primary focus tended to be on the

management of day-to-day patient care tasks, rather than on intraprofessional learning or improving collaborative practice, which aligns with a study investigating physicians' learning practice.[40] Furthermore, our observations revealed that intraprofessional learning opportunities were not always recognized, and residents explicitly focused on learning medical content while learning collaboration remained unintentional. The collaborative practice was mainly task-oriented, with limited collective reflection on intraprofessional collaborative care, whereas the scarce reflection that did occur focused more on outcomes than on an evaluation of the collaborative process. Remarkably, when prompted during the interviews, residents demonstrated increased recognition of learning opportunities. Although residents certainly learned from their intraprofessional interactions, we argue that to improve collaborative patient care through intraprofessional workplace learning, a shift of focus is necessary to make it a more deliberate practice towards desired collaboration outcomes.[40] Examples from our interviews and other studies indicate that a lack of (collective) reflection could result in the enforcement of undesired behaviors and stereotypes without any correction.[41-43] Furthermore, individuals practice agency when deciding whether or not to engage in activities and in what manner.[27,37] Reflecting on our findings, we found resonance with Evans's concept of bounded agency, where agency is a socially situated process bound by "past and imagined future possibilities, which guide and shape actions in the present, together with subjective perceptions of the structures [learners] have to negotiate".[38] Residents' engagement in intraprofessional interactions was shaped by their preconceived ideas about learning and intraprofessional collaboration, perceptions of the norms and practices of the clinician environment and what opportunities they believed they were granted by the workplace (affordances). Because of a lack of awareness of intraprofessional learning opportunities and perceived limited affordances, individuals are unlikely to decide to engage in intraprofessional collaboration and learning in a deliberate manner. Our study contributes by providing insights into the complex interplay of learners' bounded agency and workplace affordances in the context of intraprofessional workplace learning. In doing so, it offers direction on how intraprofessional learning for collaborative care could be improved: by addressing individuals' convictions about intraprofessional learning and collaboration, by stimulating critical individual and collective reflection[44], and by making intraprofessional learning a more explicit and integral part of the learning environment and training curricula.[41] Additionally, the organization of work should provide sufficient space and opportunities for intraprofessional learning.[6,27] This can be achieved through a distribution of work that enables

residents to actively participate in intraprofessional care teams, while also allowing sufficient time for collective reflective practice. By addressing both individuals' agency and workplace affordances[27], intraprofessional learning can become a more intentional and purposeful endeavor that fosters collaborative practice and improves patient care outcomes.

The findings of this study suggest a potential for enhancing shared collaborative responsibility among physicians. Our findings, as well as previous ones, highlight the importance of fostering psychological safety and a sense of belonging in healthcare teams, so that individuals can effectively learn and collaborate together.[19,45] Consistent with previous research, we observed a tendency towards working mainly within one's own specialty team, at times exhibiting an 'us versus them' mentality, with limited collective reflection on collaboration and patient care.[42,43] Furthermore, residents appeared to feel most comfortable learning within their own or closely related specialties, showing less interest in learning from outgroup specialties that were perceived as more divergent from their own.[42,43] In line with previous research, we found that in conflicts individuals tended to retreat into their own disciplinary silos and hide behind their respective responsibilities, causing residents to feel disengaged and to shift responsibility to their supervisor.[21,42,43] These observed tendencies are not surprising, given that residency training remains structured around disciplinary silos and predominantly focuses on assessing individual rather than team performance.[2,7,9,11] Furthermore, when viewed through the lens of the 'ingroup projection model', these challenges may arise precisely because the medical professionals share a common overarching identity as physicians, yet possess distinct specialty identities that they each project as the correct image for the profession, viewing divergent specialty identities in a negative light.[46] This sets intraprofessional collaboration apart from interprofessional collaboration, where differences between professions are less identity-threatening and can be observed more neutrally. We argue that to overcome these barriers, a cultural shift is required, moving from a focus on individual performance to recognizing team identity and collective performance and responsibility.[7,9,42] Addressing the collaborative culture in the workplace is important because residents adopt and internalize the attitudes and behaviors of role models in clinical practice.[7,11,43] We need to better recognize that interprofessional interactions can be both challenging and a fruitful learning experience, by providing better guidance and support for residents to reflect together on their experiences, so that dissonances can be addressed and utilized as fertile learning ground for finding a shared team identity.[21,43,47] By embracing a culture of shared collaborative responsibility and

providing opportunities for critical reflection on intraprofessional collaboration, both in and on action, we can help equip residents with the attitudes and skills they need to collaborate effectively across specialty boundaries for the benefit of their patients.

The resident-supervisor dyad deserves specific attention, as it appeared to be a pivotal component of intraprofessional workplace learning. As residents looked primarily to their own supervisors as role models, supervisors played an important role in determining the prevailing norms and practices of the clinical environment that residents adopted. Furthermore, supervisors facilitated or hindered residents' participation in intraprofessional learning opportunities. Specifically, we observed a tendency where supervisors would take over intraprofessional care in cases of higher complexity, which may bypass the opportunity for residents to actively participate in intraprofessional interactions in complex care situations and to learn from these interactions. To address this, we need to empower supervisors and residents with the necessary skills and tools to allow residents to fully engage and benefit from the learning opportunities of complex interprofessional care.[6,48]

It is important to take into account both the strengths and limitations of this study when interpreting its results. Qualitative research aims to enhance our understanding of a complex reality, rather than to produce results that can be generalized.[49] A strength of our study is the ethnographic approach, which enabled us to uncover in-depth insights that could not have been otherwise obtained. This study was carried out in a single academic hospital, and it is possible that certain aspects of our findings may not be transferable to other contexts. However, we addressed this limitation by providing a thick description, allowing readers to discern the relevance and transferability of our findings to their own unique contexts. Second, although field observations can provide valuable insights, it is impossible to fully capture individuals' thought processes, and the data collected may be open to interpretation by the researcher. We are conscious that our interpretations may be influenced by our own perspectives on learning, which may not always align with the learning perspective of the observed professionals. The absence of observable evidence of learning does not necessarily imply a lack of learning, and it was not feasible to reiterate every detail in interviews. To address these challenges, we made a deliberate effort to discuss them as part of our reflexivity process.

This study has several implications for practice and future research. First, this study offers valuable insights for supporting intraprofessional workplace learning in the clinical learning environment. Given the complexity and dynamic interplay of

factors that affect intraprofessional workplace learning, interventions should focus on expanding workplace affordances and supporting agency by residents and supervisors. These could include creating more time to interact in the workplace and to critically reflect on intraprofessional collaboration during collaborative activities, and providing guidance to leverage intraprofessional conflicts as learning opportunities. We propose that further steps in research should include a participatory research approach to develop and design interventions for intraprofessional workplace learning that could be integrated in daily practice. By fostering collaboration between researchers and practitioners, we could effectively bridge the gap between research and practice to create sustainable improvements in intraprofessional workplace learning. Second, we propose that further research is needed to better understand patients' perspectives and expectations. We observed a lack of direct patient involvement in intraprofessional collaboration. Exploring patients' viewpoints will enable the design of interventions that effectively integrate patient involvement in intraprofessional learning and collaborative practice.[50] Finally, it would be interesting for further research to explore in depth how socialization, professional identity formation and individuals' convictions about learning play a role in intraprofessional workplace learning. This study was conducted in a selected time period and could not deeply explore how these aspects evolved over time.[51]

Conclusions

Daily practice in complex tertiary care offers many opportunities for intraprofessional learning. However, because of a complex interplay of underlying processes, involving residents' agency, ingroups and outgroups, and communication about intraprofessional collaboration, these opportunities are not deliberately utilized, and physicians still tend to work in disciplinary silos. This study underscores the importance of transforming the workplace into a true intraprofessional learning environment that fosters deliberate practice and shared responsibility in collaborative patient-centered care, so that we can effectively prepare residents for their roles and responsibilities in collaborative practice and, ultimately, improve patient care.

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Appendix 1
Topic list

Topic	Sub-topic
Context	
Intraprofessional interaction and learning	Actors and roles
	Communication (verbal and non-verbal)
	Position and attitude
	Behavior and rituals
	Emotions
Space	
Artefacts	
Time	
Yourself as the observer	

* Elements that were added to the topic list based on input from the sounding board group and/or reflection on the pilot observation.

	• When did the intraprofessional contact occur? • What is the reason for intraprofessional interaction? • What is the complexity of the intraprofessional task? • What is the relationship to other activities?
	• Which actors are involved? • What are the roles of involved actors? • What are the goals of involved actors? • What are the contributions of involved actors?* • What is being said? • What is not being said? • What language is being used by the actors? (e.g., use of jargon) • What nonverbal communication is observed? • What communication is observed related to learning? • What is the physical position in the space of the actors? • What is the attitude of the actors? • What is the learning attitude of the actors? • What are the hierarchical dynamics?* • What behavior, rituals and culture* are observed? • What behavior, rituals and culture* are observed with respect to learning? • What emotions are expressed by the actors?
	• What are the characteristics of the physical or digital space of intraprofessional interaction?
	• What artefacts are involved? • How are these artefacts applied?
	• What is the duration of the observed? • Is there possibility to accelerate/decelerate?* • What is the perception of time of the actors and of the observer? • How is the workload perceived?*
	• How am I experiencing the observation? (emotions, interpretations, interactions, issues)

Appendix 2
General interview guide

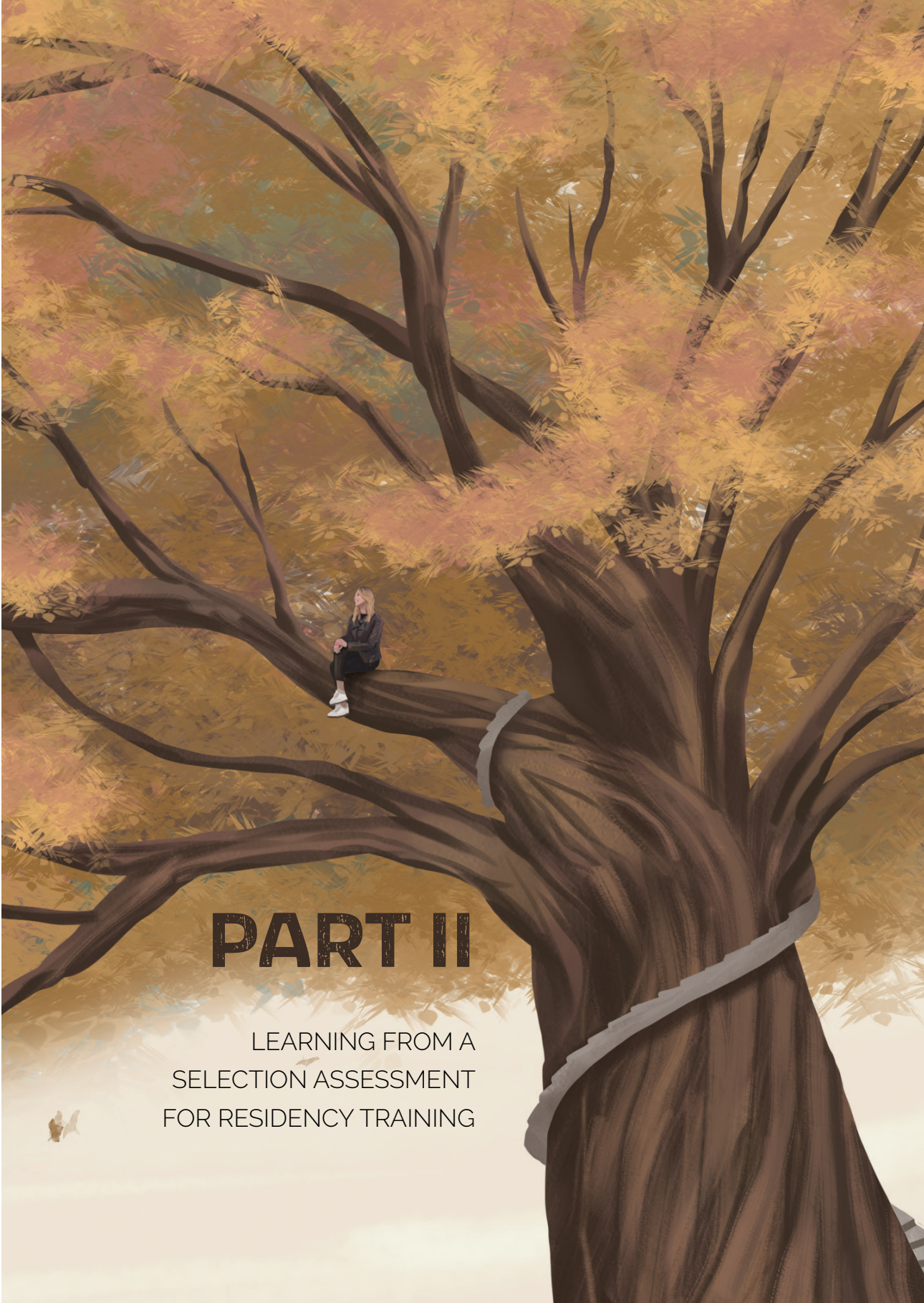
	Probing questions
Opening	I have observed you for a couple of days during your work activities. *OR* I have observed you during your interaction with a colleague. How do you look back on that now? Were these "normal" days *OR* interactions for you? *If different:* What was different? What made it different from normal?
General questions	How would you describe your role in collaboration with other specialties in this internship?* How do you experience collaboration with other specialties in this internship?* Is collaboration with other specialties in this internship different from other internships?* *If yes:* What makes it different? Why do you think that is the case? *If no:* What makes it similar? How does that affect your intraprofessional learning?*
Situational questions	*The researcher briefly describes an observed situation. (For example: On Monday morning, you reviewed a patient on the department together with John from surgery).* Is it okay for you to talk about that situation? *The researcher then poses more in-depth questions in order to gain insight into the underlying processes and the role of context in this, and to gain insight into the learning outcomes.* How do you look back on that? / What can you remember about it? What made you do …? / What were the reasons that you did …? What did you think about …? / How did you experience …? How did it benefit the patient? What determined that? How did it benefit you? What determined that? What did you learn? What determined that? Did this situation make you think differently about …?* Did this situation make you do anything differently?* Would you handle this situation differently next time?* If you could go back, what would you do differently?* Would you handle things differently in the future?*

	Aims
	• Exploring how the respondent experienced the observation • Exploring the authenticity of the observed situations
	• Setting the stage for the interview • Gaining an overall view of the respondents perspective on intraprofessional collaboration and learning in this context
	• Giving the respondent the opportunity to indicate if they do not wish to discuss the situation. • Obtaining data on non-observable aspects • Testing observations
	• Testing observations with perceptions of respondent • Exploring considerations • Exploring attitudes/feelings • Exploring intraprofessional learning

	Probing questions
	Did you feel opportunity to learn with, from and about the others involved?* *If yes:* When and what made it a learning opportunity? *If no:* What made you not feel that opportunity? Did you feel any desire or need to learn? What would have helped you to make even better use of this situation? What would you need to accomplish … better? If you could change something, what would you want to be different about …? *After the situation is sufficiently explored, if relevant, another situation can be discussed and situations can be compared with each other to gain a deeper understanding and to identify patterns.* Was this situation a typical example of how things normally go? *If different:* What was different? What made it different from normal? *In situation A … happened, in situation B … happened.* What made these situations different? What made you do … different?
Closing	What would you like to recommend the Radboudumc to make intraprofessional workplace learning a success? Is there anything that we did not yet or insufficiently address? Do you have any further questions or comments?

* Questions that were added to the general interview guide based on input from the sounding board group and/or reflection on the pilot observation.

	Aims
	• Exploring needs / opportunities
	• Gaining insight by comparing situations • Identifying patterns
	• Collecting ‘golden tips’
	• Checking that respondent was able to discuss what they wanted



PART II

LEARNING FROM A
SELECTION ASSESSMENT
FOR RESIDENCY TRAINING

CHAPTER 5

Reframing selection as a learning experience: insights from a residency selection assessment

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Abstract

Purpose

Selection for postgraduate medical training is high-stakes and complex. The learning value of assessments for selection has, thus far, been underexplored, limiting their uptake as potentially meaningful learning experiences. The aim of this study was to explore the learning value residency applicants derive from an intelligence, personality, motivation and competency selection assessment and what factors influence the experienced learning value.

Methods

In Autumn 2020 and Spring 2021, we conducted individual semi-structured interviews with sixteen applicants for pediatric residency training. Selection outcomes were unknown at the time of the interview. Interviews were transcribed verbatim and thematically analyzed.

Results

Participants reported that the assessment was valuable in fostering self-reflection and self-awareness, embracing self-acceptance, pursuing development goals, assessing professional fit, and harnessing motivational drivers in work. The experienced learning value was influenced by applicants' ability to interpret its results, their focus on the high-stakes selection process and concerns regarding the acceptability and credibility of the selection tool.

Conclusions

While the selection assessment showed learning potential, its learning value was impeded by a preoccupation with the high-stakes nature of the selection procedure. Intentional integration of the selection assessment in the learning curriculum may play a pivotal role in realizing its learning potential.

Introduction

Selection for medical residency training is a high-stakes and complex endeavor. It involves substantial resource and time investments and carries immense societal responsibility in selecting individuals capable of becoming highly competent clinicians.[1,2] Consequently, there is a growing call to adopt more evidence-informed approaches in residency selection processes.[2,3] Selection processes are increasingly recognized as high-stakes assessments, underscoring the importance of incorporating underlying assessment principles in the design of selection processes.[3,4] This implies that in addition to considering predictive validity and reliability, the design and evaluation of selection processes should encompass acceptability, feasibility, and educational impact (i.e., its learning effect).[4,5]

The existing literature mainly focuses on predictive validity and reliability,[1,4,6,7] and increasing attention has been given to the acceptability of selection methods.[4,8-10] However, the learning value of selection assessments remains largely underexplored. This represents a considerable missed opportunity as it disregards the learning potential of selection assessments, disconnecting selection experiences from the learning curriculum.[11] Strengthening the recognition and utilization of the learning potential of assessment for selection could empower residents to better leverage the valuable insights it can provide for their professional development.

This lack of recognition of the learning value of selection experiences may be attributed to the inadvertently created assumption that a dichotomy exists between summative and formative assessment.[12,13] This presumed dichotomy overlooks the potential for high-stakes summative assessments to facilitate learning. To unlock the learning potential of high-stakes selection assessments, we must explore how the information produced in selection processes could facilitate meaningful learning in order to enable its informed integration into the learning curriculum.[3]

We set out to explore the perspectives of applicants on the learning value of an assessment used in the selection procedure for pediatric residency training. This selection assessment evaluates intelligence, personality, motivation, and a set of desirable competencies. The primary aim of this study was to gain an understanding of the experienced learning value of the assessment, and to identify factors that influence this experienced learning value. We defined the learning value of the assessment as any learning from the assessment as

perceived by the applicants, including gained insights or knowledge and changes in attitudes, beliefs or behaviors resulting from the assessment. We did not adhere to one particular theory of learning, but instead we adopted a broad perspective to encompass the full spectrum of learning as experienced by the applicants. Our aspiration was that through exploring the learning value of this selection tool, we would obtain valuable insights that enable us to better utilize its learning potential. Strengthening the connection between the selection process and the learning curriculum holds significant value, considering the substantial resources invested, efforts of applicants and training programs, and the wealth of applicant information gathered. The research questions of this study were: (1) What learning value do applicants derive from the assessment? and (2) What factors influence this experienced learning value?

Methods

Setting

This study explored the learning value of an assessment tool used in the selection procedure for pediatric residency training in the Education and Training District East-Netherlands. In the Netherlands, access to postgraduate training programs is through open-market selection procedures. Many graduates opt to gain work experience before applying, such as working as a doctor not in training or as a doctoral researcher, to increase their chances of acceptance. Selection practices vary between districts as there is no national framework for residency selection. Often multiple selection procedures are conducted annually, as residency programs can commence at any time throughout the year. Residency positions are in high demand and highly competitive. When rejected, applicants may choose to move to another training region or apply to another specialty training program. A limited number of applicants are allowed to reapply for the same program. The acceptance rate for the East-Netherlands pediatrics residency training program is approximately 20% of applicants, with an average of six positions available annually. The training program lasts five years and consist of rotations in university and associated teaching hospitals within the district.

The selection procedure

The selection procedure comprises three consecutive parts: First, applicants submit an application letter and resume. Second, they undergo an electronic assessment (EA) that evaluates intelligence, personality, motivation, and competencies. After taking the EA, applicants meet with a certified human resources (HR) advisor

who explains how to interpret the results and encourages them to reflect on their experiences. Applicants then write a reflective report, and the HR advisor writes a summarizing report. Both reports are approved by the applicant before being shared with the selection committee. Finally, applicants participate in two semi-structured interviews, focusing on a further exploration on motivations and developmental opportunities in accordance with pre-established competencies.

This study focused on the learning value of the EA because it provides applicants with detailed self-information that may be valuable for their professional development. The EA is an online aptitude test developed and validated by ©PiCompany (for details see Appendix 1). The EA encompasses four elements: intelligence compared to a Dutch control population at the university master level (cognitive capacity), personality evaluation using the five-factor model[14] (personality), assessment of motivational orientation (drivers), and a composed score depicting applicants' ability to develop a set of desirable competencies considered relevant for pediatric practice (developability of competencies). The desirable competencies were carefully chosen in a four round Delphi Study[15] involving program directors, pediatric consultants, residents, a human resources manager, and an external consultant. Applicants receive a detailed report outlining their results for each element. Figure 1 provides an overview of the selection procedure and an illustrative example of the EA result overview page.

Study design

Drawing upon a constructivist paradigm, we designed a qualitative study to explore the learning value of the EA. We employed a qualitative approach because it is well-suited for studying phenomena that are not yet fully understood.[16]. We conducted individual, semi-structured interviews to allow for an in-depth exploration of the participants' perspectives.[16]

Data collection

All applicants who participated in the EA during the two consecutive selection rounds for pediatric residency training in the Education and Training District East-Netherlands in Autumn 2020 and Spring 2021 were invited to participate by the secretarial office before taking the EA. Among the twenty-three eligible applicants, sixteen agreed to participate.

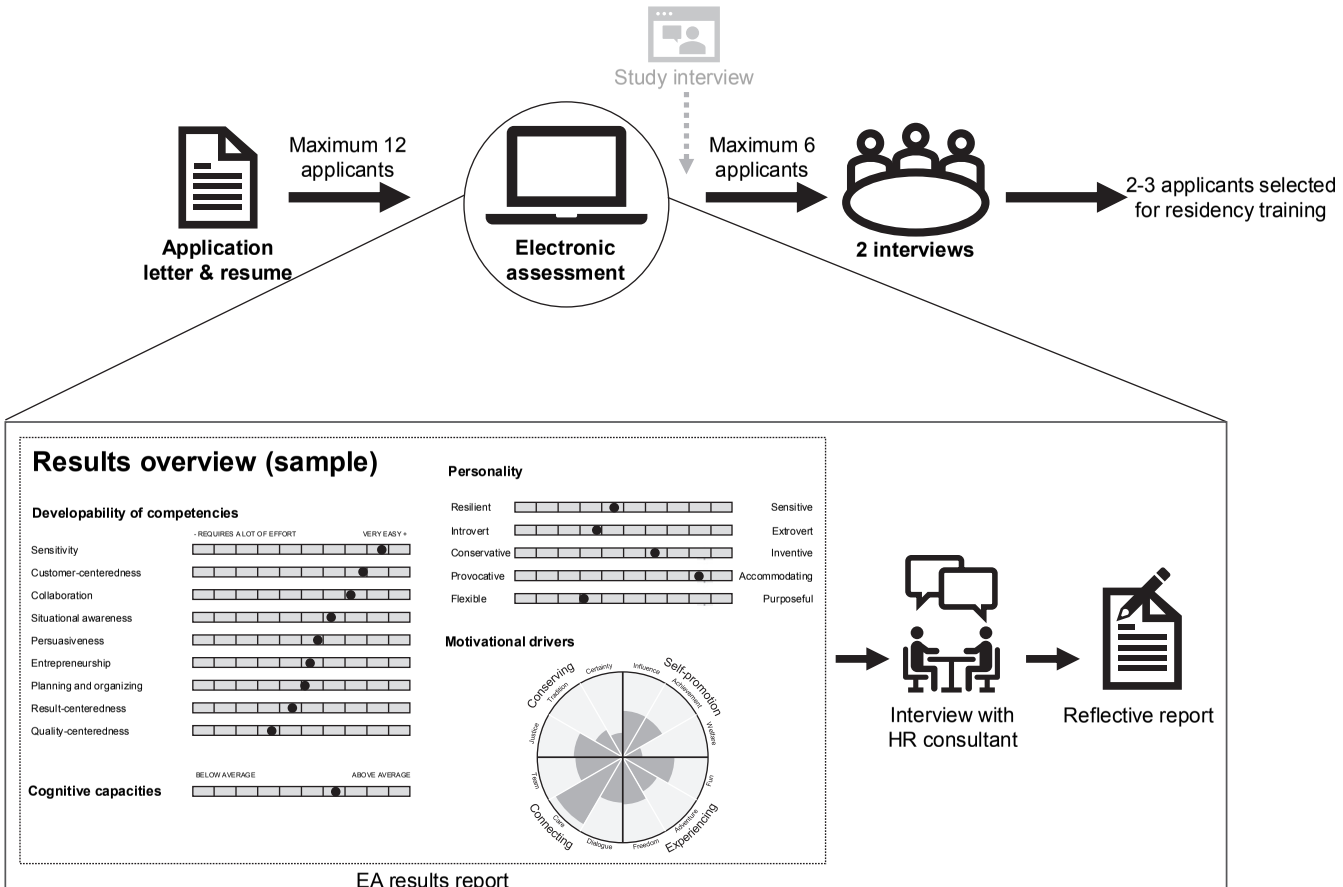

Figure 1 Visual summary of the selection process and illustrative EA results report

All interviews were conducted by the main researcher (LT). We used a semi-structured interview guide (Appendix 2), aiming to delve deeply into participants' perspectives regarding the EA's learning value and the factors influencing their perceptions. Interviews took place within one week after completing the EA and prior to the selection interviews, to ensure that participants' opinions were not influenced by the outcomes of the application procedure. Data collection took place during the COVID-19 pandemic, therefore all interviews were conducted through a secured video-calling program. Interviews were audiotaped and transcribed verbatim.

Data collection and analysis were conducted iteratively. After two selection rounds, the research team established that the data, considering the focused study aim, the depth reached in the interviews and the diverse perspectives represented in the sample, contained sufficient breadth and depth to answer the research questions.[17]

Data analysis

Transcripts were analyzed using Atlas.ti software, following the principles of reflexive thematic analysis outlined by Braun and Clarke (2006).[18] This approach was chosen as it aligns with the constructivist paradigm and our inductive data analysis approach. It involves six iterative steps: (1) familiarizing oneself with the dataset, (2) generating initial codes, (3) identifying themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.

After familiarizing ourselves with the data, LT and LHT independently coded all transcripts using an inductive approach. Following each interview, LT, LHT and a third researcher (JD or MW) reviewed and discussed the coded transcripts, collaboratively developing a codebook. Disagreements were resolved through discussion. This collaborative approach provided valuable insights in interpreting the meaning of the data fragments.

The research team discussed the codes and collated them into potential themes. Themes were constructed beyond the semantic level, encompassing not only the literal content of the interviews but also delving into implicit meanings and patterns across the data. This interpretive process was enriched by using the researchers' own perspectives, embracing a constructivist approach to the analysis. In a recursive process with the research team, themes and underlying data were critically reviewed to come to the findings reported in this manuscript.

Reflexivity

The research team brought together diverse perspectives, encompassing roles including program director, educational researcher, department head, HR advisor, and individuals at different career stages. This diverse composition was instrumental in cultivating reflexivity throughout the entire research process. The researchers acknowledged and discussed their own assumptions about the phenomenon before analysis. The use of reflective journals and engaging in discussions about personal assumptions in relation to the research data fostered reflexivity and confirmability.

Ethics and consent

This research was performed in accordance with the Declaration of Helsinki. This study was approved by the Netherlands Association for Medical Education (NVMO) Ethical Review Board (file number 2020.2.12). Participants were informed of their rights, the aims of this study and how their data is protected. Importantly, they were assured that their participation in the study would have no impact on their application procedure. Written informed consent was obtained from all participants. All data were treated strictly confidentially and were pseudonymized prior to analysis. To ensure participant confidentiality, research team members involved in the selection process (EC, JV) did not have access to full interview transcripts.

Results

Learning value

We identified four themes that reflect the learning value reported by the respondents: (1) enhancing self-reflection and self-awareness, (2) embracing self-acceptance or pursuing development goals, (3) evaluating professional fit, and (4) harnessing motivational drivers in work.

Enhancing self-reflection and self-awareness

Respondents indicated that the EA encouraged and supported their self-reflection by providing a structured framework [Quotation 1 (Q1), see Table 1]. For some, reading the EA itself was sufficient in gaining insights, while others found the reflective interview with the HR advisor and the reflective report to be instrumental by concretizing and enriching their reflections.

While the EA often reinforced their existing self-perceptions rather than introducing entirely novel insights, participants still appreciated that their self-perceptions were affirmed by the EA. Some respondents attributed this lack of novel insights to their already existing habit of engaging in regular self-reflection [Q2]. Nevertheless, they acknowledged that the EA still contributed to a deeper self-understanding, as its individualized, structured, and focused nature facilitated additional insights, for example increased awareness of potential pitfalls related to their strengths or better understanding why certain competencies demanded more energy [Q2-3].

Several respondents indicated that they did gain new insights about themselves through the EA, such as uncovering previously unrecognized pitfalls or recognizing the positive aspects of what they previously perceived as weaknesses [Q3]. Some participants recognized personal growth through the EA and expressed satisfaction with seeing their progress reflected in the results.

Embracing self-acceptance or pursuing development goals

Among some respondents, reflecting on the EA results led to self-acceptance, embracing their personal attributes without feeling the need for change [Q4]. For others, the EA's identification of their pitfalls prompted setting new development goals or provided affirmation and increased motivation for their existing goals [Q5]. For some, the reflective report was instrumental in concretizing their development goals. Respondents believed that their heightened self-awareness would assist in better recognizing their pitfalls in practice, facilitating targeted efforts towards improvement [Q6]. Several respondents highlighted the potential benefits of incorporating the EA into progress meetings with their training supervisors, believing that such reflection could further support their development.

Evaluating professional fit

Respondents noted that the EA offered valuable insights into what competencies are important for pediatric practice, which triggered them to contemplate their fit for the profession. Scoring well in relevant competencies or discovering alignment with their motivational drivers could be interpreted as an affirmation of fit [Q7]. Conversely, lower competency scores left some respondents feeling uncertain about how it might negatively impact their selection prospects.

Table 1 Supporting example quotations regarding the learning value

Theme	Example quotations
Enhancing self-reflection and self-awareness	Q1: "Naturally, you do that [reflection] quite often without being aware of it, but not in such a structured way." (R6) Q2: "During our medical training it sometimes feels that all we do is reflect on things, but this specific way – focused on one's own personality and dissecting it in different domains – gave me a new understanding of how I function and how I am made up." (R12) Q3: "So, it provided much insight when I realized: 'oh, I invest more energy because things don't come that easy to me based on my characteristics and personalities'." (R16)
Embracing self-acceptance or pursuing development goals	Q4: "So, it helps me knowing how I am made up […] That's how I function, and I don't need to expect anything else from myself." (R15) Q5: "I believe that this would also have been on my mind without the assessment, but I probably wouldn't have been quite that aware of [a pitfall]. […] Yes, I would say an extra confirmation and perhaps a bit of extra motivation for me to work on it." (R2) Q6: "But I believe that you can be a bit more self-critical and look at yourself from a distance and say: 'wait, this is where I go wrong. I need to take a step back now so that I don't end up on the other side of that characteristic'." (R10)
Evaluating professional fit	Q7: "One of my most important drivers was care. Well, knowing that I'm in the right place puts me at ease." (R3) Q8: "Taking a broader view and realizing, all right, this too is part of the profession. Apparently, this is difficult for me right now. I am now trying to figure out how I can develop that, and how to become more focused on that aspect." (R1) Q9: "Those competences I didn't think of myself at first are clearly less important to me, and less important part of being a physician, I believe." (R8)
Harnessing motivational drivers in work	Q10: "When you run into problems, you can reflect on your assessment and think to yourself: 'this is because I miss a sense of team spirit, or because people cling to traditions here that don't suit me or don't really drive me'." (R7)

Several respondents acknowledged that the EA revealed competencies that they had not initially recognized as relevant for their career. This newfound awareness sparked increased motivation among respondents to actively work on developing these competencies [Q8]. On the other hand, other respondents expressed disagreement with the relevance of certain competencies, attributing less significance to them for their learning process [Q9].

Harnessing motivational drivers in work

Participants reported that the EA yielded valuable insights into their motivational drivers in their professional careers. They believed that this enhanced understanding could guide them in seeking job opportunities that align with their motivational drivers. Additionally, some respondents believed that these insights could be a valuable resource to draw upon during challenging periods in their careers [Q10].

Influencing factors

We found that the experienced learning value was affected by applicants' (1) ability to interpret the assessment results, (2) focus on selection, (3) beliefs about the acceptability, and (4) perceptions of the credibility of the assessment.

Ability to interpret assessment results

We found that an important prerequisite for learning was that applicants were able to interpret the EA results, which involves the ability to interpret the meaning of the result and the ability to apply and translate the result to their own work practice. Participants expressed that the HR advisor's explanation played a vital role in facilitating the interpretation and translation of the results [Q11, see Table 2].

Focus on selection

The fact that the EA was part of the selection procedure significantly impacted applicants' learning experiences. While some respondents solely focused on the selection aspect, viewing the EA merely as a tool for the selection committee, others displayed more sensitivity to its potential value for personal growth [Q12-14]. During the study interview, some respondents acknowledged that it was only then they came to recognize what they learned from the EA, which they had initially overlooked because they were focused on the selection [Q14].

Table 2 Supporting example quotations regarding the influencing factors

Theme	Example quotations
Ability to interpret assessment results	Q11: "The [meeting with the HR advisor] helped me understand those results within my profession." (R12)
Focus on selection	Q12: "I believe that the assessment is more meant for those on the recruitment committee than for me." (R4) Q13: "Yes, I felt that it was very informative for me and that's how I approached it. I expected to learn a lot of things that could be beneficial to me too." (R16) Q14: "The first thing you think is: 'what kind of image of myself does this bring across for the recruitment procedure'. And it's not as if the first thing that comes to mind is: 'well, I'll start to work on these pitfalls that affect my work', because it's so connected to that recruitment procedure and to all the interests involved." (R7) Q15: "In the end, you want to present yourself in the best possible way. You want it to present an honest image, but one that shows the best version of yourself. I really believe that it makes a difference whether you fill out an assessment purely for yourself, or as part of a recruitment procedure." (R6) Q16: "You do get the feeling: this [reflective report] can make or break my selection procedure." (R6)
Acceptability beliefs	Q17: "I particularly liked the fact that you can add certain nuances and say 'no, this isn't quite right'. [...] I liked that because otherwise, it feels as if it results in a conclusion that you have no say over." (R8) Q18: "So yes, I'll be honest and say that I was a bit skeptical at first. But afterwards I thought, well, I'm not skeptical at all. In fact, this is a really excellent interim step for your selection procedure. Look, I obviously don't know how it's going to work out for me, but I believe that objectively speaking, this is a good way to consider applicants." (R10)
Perceptions of credibility	Q19: "I mostly wonder 'how did this negative result come to be?', instead of 'how can it be helpful to me?'." (R4) Q20: "Yes, that makes that I find it difficult, can you really fully trust a test?" (R14)

Throughout the EA process, respondents were preoccupied by how the results would be perceived by the selection committee [Q14]. When taking the EA, applicants contemplated what a socially desirable outcome might be, aiming

to present themselves in the best possible light [Q15]. Respondents expressed apprehension when confronted with outcomes perceived as less favorable in light of the selection procedure. Several participants reported that during the process of writing the reflective report, they were preoccupied with how it would be perceived by the selection committee and how it could support their personal narrative within the context of the selection process [Q16].

Acceptability beliefs

Participants expressed diverse opinions regarding the acceptability of the EA as a selection tool, sharing a range of arguments. Factors that seemed to enhance the perceived acceptability included explaining how the EA is used in the selection process, conveying the purpose of including the EA in the selection procedure, and offering applicants the opportunity to clarify their perspective on the results through the HR advisor and the reflective report [Q17]. Respondents who considered the EA less acceptable as a selection tool also appeared less inclined to view it as a learning tool. Some respondents expressed that they initially held negative views towards the EA but regarded it more positive after reviewing the comprehensive results and receiving explanations from the HR advisor [Q18].

Perceptions of credibility

Respondents tended to question and scrutinize unfavorable EA outcomes more than positive ones, providing explanations for perceived inaccuracies or elaborating on how they believed certain results might have been flawed [Q19]. Participants reflected that they felt a stronger desire to understand how unfavorable outcomes were derived. Often, respondents tended to disregard EA results they perceived as inaccurate. We found that respondents who perceived more unfavorable outcomes appeared to harbor more doubts about the EA's overall credibility, leading them to attach less value to it for their learning [Q20].

Discussion

The learning value of assessments for selection remains underexplored and potentially underutilized. Our study investigating the learning value residency applicants derive from an intelligence, personality, motivation, and competency selection assessment revealed that the EA played a supportive role in fostering self-reflection and self-awareness, embracing self-acceptance, pursuing development goals, assessing their professional fit, and harnessing their motivational drivers in work. However, we found that the potential learning value seemed to be

overshadowed by the EA's association with the high-stakes selection procedure. This finding is rooted in our observation that some applicants did not recognize the learning value until the study interview and reflected that they were preoccupied with concerns about the acceptability and credibility of the selection tool, as well as how their results and their reflections on the results would be perceived by the selection committee. These apprehensions seemed to divert their focus from authentically engaging with the EA's learning potential.

The learning value reported in this study expands on prior research investigating similar assessment tools outside of selection processes. Dijkhuizen et al (2018) investigated a more extensive assessment conducted as part of the residency training program to support residents' personal development of generic competencies.[19] Their assessment followed an exclusively formative approach, stressing confidentiality and participation without summative consequences. They observed that the assessment stimulated self-reflection and self-awareness, and can increase confidence in one's personal attributes and inspire new development goals. Our study is the first to demonstrate that this type of assessment, traditionally employed for learning in low-stakes formative contexts, exhibits valuable learning potential even when utilized within a high-stakes selection procedure.

However, our findings also revealed that potential learning value was hindered by applicants' focus on the high-stakes selection aspect. De Visser et al (2018) explored the learning value of a selection procedure for undergraduate medical training, with different selection tools in a similarly high-stakes setting.[11] Consistent with our findings, they described that undergraduate students primarily perceived selection as an obstacle and not as a learning opportunity. Although we found that this focus on selection did not preclude learning, the fact that the EA is part of the selection procedure did seem to significantly alter applicants' learning experience. As an illustrative example, some respondents seemed to primarily focus on presenting socially desirable EA outcomes [Q15] and tailoring their reflective reports to meet the selection committee's expectations [Q16], instead of engaging in authentic self-reflection. Dijkhuizen et al (2018) emphasized that trust between the resident and facilitator, along with an environment where residents could reflect without worrying about potential consequences, were critical for the success of their development-oriented assessment.[19] It seems likely that the learning value of the EA would be better realized either outside the selection procedure or through implementing changes that foster a safe learning environment and authentic reflection, addressing applicants' preoccupation with meeting selection committee's expectations.[20]

It has been argued that a lack of feedback is what hampers the educational value of high-stakes summative (selection) assessments.[11,21] Our study illustrates that, additionally to providing feedback, dialogue with the HR advisor about the assessment results and sufficient explanation about the assessment's purpose, role and psychometric properties was important to facilitate learning. Our findings demonstrate that for applicants to be open to learning from assessment, they must perceive its results as credible, view it as an acceptable tool, and recognize and embrace it as a pertinent learning opportunity.[12,22] To effectively support learning, comprehensive information about the assessment's purpose, role and psychometric properties must be provided to applicants, and offering guidance on interpreting the results and how to leverage them for their learning journey is essential.[12]

Strengths and limitations

To our knowledge, this is the first study to examine the learning value of assessment for selection for postgraduate medical training. Our study explored a specific assessment within the selection procedure of one specialty training district. However, given the similarly high-stakes nature of assessments for selection in other contexts we anticipate that our findings can provide valuable insights for others.

The interviews were conducted during the selection procedure, specifically before the selection interviews, to ensure that participants' responses remained unaffected by the outcome of the procedure. However, it is important to acknowledge that the fact that the interviews took place during the selection process may have influenced participants' responses. To mitigate socially desirable responses, we assured them that the study would not impact their selection process in any way and that their input would be treated strictly confidentially. Furthermore, the interviewer was not involved in the selection process.

Implications for practice and future research

This study holds important implications for learning in selection practices. We propose that supportive measures can be implemented to enhance learning from assessments retained in selection procedures. Firstly, the fact that some respondents indicated that they initially viewed the assessment in a negative light or only realized the learning value during the study interview suggests that providing more deliberate attention to learning could be beneficial to raise awareness of its learning potential. Secondly, providing comprehensive guidance, such as the explanations by the HR advisor, seems essential to ensure that learners

can interpret the assessment results effectively. Additionally, more thoroughly addressing concerns about an assessment's acceptability and credibility by explaining its purpose and psychometric qualities could help lower preoccupation with these factors to allow applicants to focus on their learning experience. Lastly, respondents noted that integrating the EA into progress meetings with their supervisors could support further development. We propose that more explicit and deliberate integration of the selection assessment into the curriculum, for instance through self-directed learning plans and portfolios or dedicated coaching sessions, would bridge the disconnection between the selection experience and the learning curriculum, empowering learners with focused and personalized guidance in their lifelong learning journey. Furthermore, we argue that, considering the substantial personal investments involved, providing guidance to learners who are not accepted into the residency program is equally imperative. Finally, considering the comparable high-stakes nature of the larger scale assessment practice of selection into medical school, we propose that these lessons from our study may also apply to the undergraduate context. Future research could explore and refine methods for achieving a better integration of assessments for selection in the learning curriculum and assess their impact on learning outcomes.

Conclusions

In conclusion, while the selection assessment demonstrated potential learning value in fostering self-reflection and self-awareness, self-acceptance, development goals, and insights into professional fit and motivational drivers in work, its learning value was overshadowed by a preoccupation with the high-stakes nature of the selection process. Deliberate guidance and explicit integration of the selection assessment into the learning curriculum could prove pivotal in fully leveraging its potential.

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Appendix 1
Assessment information

This online, computer-based assessment is provided by PiCompany. PiCompany specializes in advanced online assessment and development tools, and talent analytics.

The assessment consists of three parts: the Connector Ability (intellectual capacity), the Reflector Drives (motivation) and the Reflector Big Five Personality (personality and competency).

The information in this document was provided bij PiCompany.

Connector ability 2.1
The Connector Ability assesses intellectual capacity. The Connector Ability was approved by Cotan (Dutch Committee on Tests and Testing) in 2016.

The intellectual capacity is measured based on three elements: series of figures, matrix's and numbers. The Connector Ability is a language-independent means of measuring intellectual capacity. It aims to measure "fluid" intelligence.[1] The intellectual capacity is measured adaptively, meaning that the difficulty level of presented items is adapted according to the candidate's responses. This allows a more accurate determination of intellectual capacity while limiting the number of required items.[2] The number of items per element ranges between 10-15, depending on how many questions are necessary to determine the intellectual capacity. The average test time including instructions is 60 minutes (range 30 to 100).

The candidate's results are compared to a control group based on the Dutch population of the same educational level. No significant differences in results were found based on gender, age and ethnicity.

Reflector Drives
The Reflector Drives measures motivational drivers and values related to the work environment. The Reflector Drives is based on the internationally validated value model of Schwartz, adopted to the work environment.[3,4] Twelve motivational drives, divided in four quadrants, are assessed. The adapted motivational drivers are listed below. The assessment results provide a ranking of the motivational drivers.

The Reflector Drives consists of questions in a semi-ipsative and adaptive format. Three motivational drivers are assessed in one question. Each motivational driver is measured eight times in eight rounds. This adds to 32 questions in total. The average test time is 15 minutes.

Results are compared to a control group, which is balanced in terms of gender, age and discipline.

Motivational driver	**Key words**
Profile	
Power	Control, decide, direct
Achievement	Success, excel, recognition
Welfare	Financial reward, luxury, comfort
Experience	
Pleasure	Cheerfulness, humor, pleasure
Adventure	Variation, tension, taking risks
Freedom	Independence, self-direction, autonomy
Connect	
Dialogue	Encounter, diversity, inspiration
Care	Service, attention, helpfulness
Team	Together, commitment, loyalty
Preserve	
Justice	Honesty, righteousness, sustainability
Tradition	Maintain, conformity, respect
Security	Predictability, clarity, transparency

Reflector Big Five Personality

The Reflector Big Five Personality report consists of two parts: a personality and competency assessment.

Personality assessment is based on the Big Five Personality types by Howard & Howard.[5] The five factors are: emotional stability, extraversion, openness, agreeableness and conscientiousness. The assessment is based on the NEO PI-R by Costa & McCrae.[6] The assessment consists of 144 statements with a Likert-scale response format.

The competency assessment measures a person's capability to show/develop a set of desirable competency. The scores are based on a weighted combination of facets from the intellectual capacity, motivational drivers and big five personality tests. The assessed competencies are: collaboration, customer-centeredness, entrepreneurship, persuasiveness, planning and organizing, quality-centeredness, result-centeredness, sensitivity and situational awareness.

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Appendix 2
Interview guide

Topic	Questions
Opening	**How do you look back on the assessment now?** * Can you tell me what you remember from the assessment? * How did you experience it? Can you explain why you experienced it that way? * Did you recognize yourself in the results of the assessment? In which parts did you recognize yourself and in which parts did you not? * Did you discuss the results of the assessment with anyone?
Acceptability	**How do you feel about the assessment being part of the application process?** * Can you explain why you feel that way?
Learning value	**What expectations did you have beforehand about the value of the assessment?** **What value did the assessment have for you?** * What did you learn from the assessment? *Alternative: What did you take away from the assessment?* * What is the importance of the assessment for you within the application process? What do you think are the advantages and disadvantages? * What do you take away from the assessment for the job interview? * What value does the assessment have to you outside the application process? * What do you take away from the assessment for your work? * Are there things you plan to do or do differently as a result of the assessment? * What role do you think the assessment can play in your personal or professional development? Can you give an example? * Did the assessment make you look differently at the application process or training? How did that change?
Assessment elements	**Which elements of the assessment were most valuable to you?** * Can you explain why you think so? **Which elements of the assessment did you find less valuable?** * Can you explain why you think so? **What did explanations from the HR consultant mean to you?**
Closing	**What would you like to change about the assessment?** Do you have any other questions/comments?

CHAPTER 6

Professional coaching of residents: exploring the role of an intelligence, personality, motivational drivers and competencies assessment

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Under review

Abstract

Background

Professional coaching has gained popularity as an individualized intervention to support professional development of residents. Research on how tools can support the coaching process is lacking. We hypothesized that an assessment presently applied in selection for residency training, which measures intelligence, personality, motivational drivers and competencies, could be a valuable tool to support coaching of residents.

Objective

This study sought to explore the perceived value of using the selection assessment for professional coaching in medical postgraduate training, as experienced by residents and coaches.

Methods

This qualitative study took place in the East-Netherlands Education and Training District from August 2022 to April 2023. Participants engaged in a single coaching session, where they were required to use the selection assessment. Individual interviews were conducted one week and three months after the coaching session. We included a purposive sample of seven residents from three different medical specialties, recruited via the secretarial offices. A focus group interview was held with the three participating coaches. Thematic analysis was employed to identify themes and patterns.

Results

Participants considered the selection assessment a supportive but not leading tool. Coaching sessions remained guided by residents' individual needs. It fostered residents' reflection and accelerated the coaching process. The perceived value of the selection assessment for the coaching process was affected by residents' and coaches' attitudes.

Conclusions

When incorporated in the training program, selection assessments can be helpful to support professional coaching for residents. Our findings emphasize the need for training programs to position these tools as learning instruments.

Introduction

In recent years, professional coaching (Box 1) has gained increasing prominence as an individualized intervention to foster personal and professional development of health professionals.[1,2] Moreover, coaching has been proposed as a "proactive solution to the growing epidemic of physician distress and burnout"[3], as it can strengthen personal resources, thereby reducing vulnerability to burnout.[3-6] Recognizing that residency training presents a challenging transformational period in physicians' development, integrating coaching into the training curriculum has been put forward as a promising strategy to support residents' learning journey towards becoming competent and resilient physicians.[7] Therefore, there is a compelling need for evidence to inform the effective integration of coaching and tools that can support the coaching process into residency training programs.

Box 1 Definition of professional coaching

Professional coaching is defined as "a collaborative solution-focused, result-orientated and systematic process in which the coach facilitates the enhancement of life experience and goal attainment in the personal and/or professional life of normal, nonclinical clients".[8] Professional coaching is distinctly different from mentoring as there is no formal hierarchy between the learner and coach.[9] Furthermore, it differs from clinical coaching, which is exclusively focused on the development of clinical skills.[3]

Numerous heterogeneous studies from various professional settings, including the medical field, have demonstrated the positive effects of coaching.[1,2,4,6,8,9] These studies demonstrated that coaching can enhance performance and skills, improve work-life balance, job satisfaction and engagement, foster psychological capital and autonomy, while reducing emotional exhaustion and distress, burnout symptoms, and job insecurity.[1,2,4,6,8,9] Moreover coaching has been associated with improvements in overall quality of life and resilience.[1,2,4,8,9] However, the understanding regarding the underlying mechanisms and the role of tools that can support coaching remains limited.[1,9,10] Gaining insight into what works in coaching and how tools from the workplace could be applied in the coaching process to foster professional and personal development in residents and why is crucial for shaping its implementation in the training curriculum.

Our previous research investigating the learning value of a selection assessment for pediatric residency applicants demonstrated that applicants considered the assessment a valuable learning tool. The selection assessment, which measures intelligence, personality, motivational drivers and competencies, fostered self-reflection, self-awareness, self-acceptation, and the identification of development goals. Additionally, it provided insights into professional fit and motivational drivers in work. However, we found that the learning effect remained underutilized, as the assessment is currently strongly linked to the selection procedure and lacks integration into the training curriculum. Drawing on these insights, we speculated that integrating the assessment as a tool to support coaching of residents could benefit both the coaching process and the learning effect of the assessment, better aligning it with the goals of the learning curriculum.

In this study, we set out to explore the perceived value of using the selection assessment for professional coaching in medical postgraduate training, as experienced by residents and coaches. Understanding the perceived value of the assessment for coaching is valuable for formulating evidence-informed recommendations to shape coaching practices in the postgraduate training curriculum.

Methods

Context

The research was conducted in the East-Netherlands Education and Training District for postgraduate medical training. In the Netherlands, medical graduates often work as junior doctors before entering the 4-6 years of residency training, which includes rotations in various clinical settings including university medical centers and affiliated general hospitals. Despite the growing interest in professional coaching, it is not currently formally integrated in the training program.

The assessment and the coaching intervention

The electronic assessment (EA), an online aptitude test (©PiCompany), is used in the selection process for residency training. It comprises four elements: cognitive capacity (intelligence compared to a Dutch control population at the university master level), personality (evaluated using the five-factor model[11]), drivers (motivational orientation), and a composed score reflecting

the developability of a set of relevant competencies for the respective medical specialist practice. Applicants receive a detailed report outlining their results for each element and engage in a meeting with a Human Resources advisor who explains the results and encourages applicants to reflect on the them. Figure 1 provides an illustrative example of the result overview page. After the selection process, residents are free to use the EA for their personal and professional development. The EA is presently not explicitly integrated into the training curriculum.

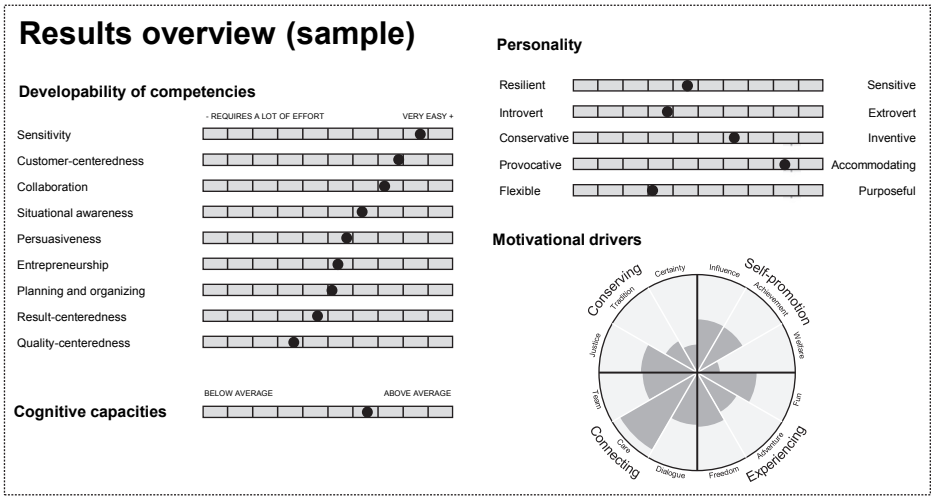

Figure 1 Illustrative example of the electronic assessment results overview page

For this study, we assembled a pool of four accredited coaches from diverse backgrounds, each experienced in coaching health professionals and having no affiliation with the training program or any other formal authority over the residents. Residents were allowed to choose their preferred coach. After an introductory meeting, residents and coaches engaged in a single coaching session, lasting approximately 1.5 hours. Residents shared the EA report with the coach prior to the coaching session. Residents and coaches were encouraged to tailor the coaching session based on their individual needs and preferences, with the only requirement being the use of the EA during the coaching process. Residents were permitted to continue their coaching trajectory outside the study procedures, if desired.

Study design

Grounded in a constructivist paradigm, we designed a qualitative study to explore the perceived value of the EA for coaching. We chose a qualitative approach because it best allowed us to gain an in-depth understanding of the participants' perspectives.[12] We employed individual semi-structured interviews to delve deeply into residents' experiences, and a focus group interview to explore and compare coaches' experiences.

Data collection

Individual interviews with residents

A purposive sample of residents from three medical specialties (anesthesiology, gynecology, pediatrics) and at varying stages of their training were invited to participate by the secretarial offices. Initially, fourteen residents agreed to participate. However, seven residents did not proceed with scheduling the coaching session and/or the study interview, and their study participation was discontinued due to a lack of response. After interviewing the seven included residents, the research team concluded that the last interviews did not yield any new insights or themes. Considering the focused study aim, the depth reached in the interviews, and the diverse perspectives already represented in the sample, the research team decided not to approach additional participants.[13]

The residents participated in two individual interviews, which facilitated an in-depth exploration of each resident's unique experiences and perspectives. The first interview occurred approximately one week after the coaching session to capture immediate reflections and insights from the coaching experience with the EA. The second interview took place after three months, allowing for a deeper understanding of how the residents incorporated the insights from the coaching with the EA into their work practice. One resident did not participate in the second interview due to a work sabbatical. All individual interviews were conducted by the main researcher (LT) using a semi-structured interview guide (Appendix 1 and 2). Interviews were conducted either face-to-face or through a secured video-calling platform, based on the resident's preferences. Interviews took place from August 2022 to April 2023 and were recorded and transcribed verbatim.

Focus group interview with coaches

Three out of four coaches from the study pool coached at least one resident during the study period and participated in the focus group interview. The focus group interview was conducted in February 2023, after the majority of interviews with residents was conducted, allowing it to be informed by the insights obtained

in those interviews. We opted for a focus group interview, because we expected that an interactive discussion between the coaches would enrich and deepen our findings.[14] We used a semi-structured interview guide (Appendix 3) to explore the coaches' perspectives on the value of the EA in their coaching experiences. Additionally, it aimed to explore differences and similarities between the coaches' experiences as well as between different residents they coached. During the focus group interview, LT served as the main moderator, while BV acted as an observer, focusing on participants' responses and asking follow-up questions to enhance insights. The focus group interview was recorded and transcribed verbatim.

Data analysis

Interview transcripts were imported into Atlas.ti to facilitate data analysis. Our analysis followed the principles of thematic analysis proposed by Braun and Clarke.[15] Employing an iterative method, the research team engaged in extensive reading and re-reading of the interview transcripts, coding relevant text fragments, and identifying themes and patterns through collaborative discussions.

After immersing themselves in the data through repeated reading, LT and BV independently conducted inductive coding. After each interview, they engaged in a joint review and discussion of the coded transcripts, working collaboratively to develop a codebook. Disagreements were resolved through discussion, and a third researcher (EC) was consulted when necessary. This collaborative approach led to a richer understanding and interpretation of the data fragments.

Subsequently, LT and BV organized the codes into potential themes, gathering relevant data to underpin and substantiate these themes. In an interactive meeting, a subgroup of the research team (LT, EC, BV, FU, BT, JV) reviewed and evaluated the themes and underlying data. Afterward, each of the other team members critically and independently reviewed the potential themes and the findings from this meeting. Through an iterative process, LT and BV restructured and refined the themes in collaboration with the entire team, carefully reviewing and analyzing themes alongside supporting data, resulting in the comprehensive findings presented in this manuscript. ChatGPT, version 3.5, an advanced language model developed by OpenAI, was employed for language editing of the manuscript to enhance clarity and cohesiveness. The generated outputs were carefully reviewed and revised by the authors to ensure the integrity of the scientific content.

Reflexivity

The research team encompassed diverse perspectives: LT, a medical graduate and doctoral researcher in postgraduate medical training; EC a deputy pediatrics program director and pediatrician; BV an educationalist and doctoral researcher in postgraduate medical training; FU, a resident in pediatrics; BT, a pediatrician and coach; JD, a former pediatrics program director and pediatrician; MW, a pediatrics department head, professor of pediatric neurology; AB, a gynecology program director and perinatologist; WK, a senior educational researcher and professor of vocational and professional education; and JV, a pediatrics program director, professor of pediatrics with a focus on learning and development and pediatric endocrinologist. The diverse backgrounds and expertise actively contributed to fostering reflexivity throughout the research process.

Before commencing the research, the researchers acknowledged and discussed their own assumptions. Reflexivity and confirmability were further stimulated by reflective journalling and engaging in discussions about the researchers' underlying assumptions, enriching the research process.

Ethical considerations

This research was conducted in adherence to the Declaration of Helsinki. The Netherlands Association for Medical Education (NVMO) Ethical Review Board approved this study (file number 2021.8.5). We provided all participants with information about their rights, the study's objectives and how their data is protected. Written informed consent was obtained from all participants.

Results

Resident participant characteristics are provided in Table 1. A central finding was that residents and coaches considered the EA a supportive tool but it was not leading in the coaching process. They described that the tool supported residents' reflection and accelerated the coaching process. We found that the perceived value of the tool for the coaching process was affected by residents' and coaches' attitudes towards the EA.

A supportive but not leading tool

Residents and coaches commented that the residents' coaching question always remained central in the coaching process, and while the EA served as a supportive tool, it never took a leading role [Quotation (Q) 1, see Table 2]. They

regarded the EA as one of the supportive tools in the general coaching toolbox [Q2]. In the interviews, residents often initially reported that the EA did not play an explicit role during the coaching session and they believed they could have eventually achieved similar results without the EA [Q3]. However, further probing uncovered instances where (parts of) the EA were indeed used, such as when coaches referred to motivational drivers from the EA or prompted residents to reflect on their inherent qualities. This further supports the notion that the EA was supportive but not prominent or essential in the coaching process.

Table 1 Participant characteristics

Characteristics	
Median age (range)	32 (29-33)
Gender, n (%)	
Female	6 (86%)
Male	1 (14%)
Specialty, n (%) *	
Anesthesiology	3 (43%)
Gynecology	1 (14%)
Pediatrics	3 (43%)
Postgraduate Year (PGY), n (%)	
PGY 1	2 (29%)
PGY 2	4 (57%)
PGY 3	1 (14%)

* Duration of specialty training program: anesthesiology 5 years; obstetrics and gynecology 6 years; pediatrics 5 years.

A tool to support residents' reflection

We found that the EA facilitated residents' reflections in the coaching process, especially during the preparation phase. All residents revisited the EA as part of their preparation for the coaching session. Residents indicated that this process heightened their self-awareness of their personal attributes and motivational drivers, and offered insights into their personal growth [Q4-5]. Some considered it supportive in recognizing or clarifying challenges they encountered in their professional or personal life. As a result, they found it helpful to use the EA to formulate or clarify their coaching question [Q6]. Others expressed more difficulty in identifying information within the EA that could be applied to their coaching goals [Q7].

During the coaching session, residents experienced that the EA helped them articulate and concretize their reflections. For some residents, the combination of insights from the EA with reflections during the coaching session contributed to increased self-acceptance or a clearer understanding of why certain things were challenging or important to them [Q8].

Table 2 Supporting example quotations

Theme	Example quotations *	
A supportive but not leading tool	Q1:	"The EA truly is a tool that might make it easier to gain some in-depth insights. However, it's not a leading tool." (C1)
	Q2:	"I can use it now as a tool that helps me with what I am doing. Like there are numerous other tools in coaching […] Naturally, there's a variety of things that can support you and I believe that this made me realize that for those who are looking for some kind of support, this in one way to gain insight." (R3)
	Q3:	"Yes, to be honest I believe that we could also have had a similar coaching meeting there without the EA." (R2)
A tool to support residents' reflection	Q4:	"You often have some vague idea about how you carry out your work and who you are, but seeing it written down on paper and recognizing yourself in that does help make some of your characteristics, as well as your pitfalls, clearer for yourself, I believe." (R2)
	Q5:	"At those moments you think to yourself, 'clearly, I've grown in certain respects over the last couple of years.' It's nice to reflect on that and to realize, 'you know what, that's what I was like five years ago, but that's definitely no longer the case'." (R1)
	Q6:	"I do however believe that it adds something, meaning that certain characteristics become more clearly defined, which allows you to start focusing on your stronger characteristics, as well as on the pitfalls, from the get go. So in defining your coaching goal, that may be the most important role." (R6)
	Q7:	"The EA, naturally, provides a general picture of who you are. […] And during my coaching meeting, I specifically focused on one specific problem I kept running into. That made the meeting very goal orientated. The EA doesn't provide that." (R7)
	Q8:	"It was more of a confirmation, in the sense that 'okay, the thing you mention now also became clear from the EA, because your motivational drivers do indeed show that you attach great value to teams and to justice. That's quite in line with the problem I broached at that moment." (R3)

Table 2 Continued

Theme	Example quotations *
A tool to accelerate the coaching process	Q9: "It helped, I believe, get to the heart of the matter quicker." (R7) Q10: "Perhaps residents arrive at a meeting better prepared. That might be it. Perhaps it is that they looked back at [the EA], reflected on it. It's possible that such a person has a head start during such a one-off meeting." (C1) Q11: "The resident sends [the EA]. They trust you to read it. When you meet each other, the resident knows that you've read it. And the resident will then also read it again. There's a basis of trust or of… It's a different start then when you don't fully know each other yet." (C3) Q12: "Because you share your EA with that person, it feels as if she knows you already to some extent, even though you never met each other physically. In my experience, that allows you to enter into an in-depth conversation rather quickly. There's no need anymore, so to speak, to fully explore that basis." (R6) Q13: "During the meeting, I was able to refer to themes that were addressed in the EA." (C3)
Residents' and coaches' attitudes	Q14: "The EA gives you the feeling of reading your horoscope." (R4) Q15: "I'm still enthusiastic about it. It simply gives you a nice, in my case at least, insight into the characteristics, in what makes me tick." (R6) Q16: "I think that I've learned that the EA can be quite useful." (R7)

C = coach, R = resident

A tool to accelerate the coaching process

Both residents and coaches expressed that the EA helped accelerate the coaching process and allowed them to delve into deeper aspects more rapidly [Q9]. They presented a range of reasons for this, including the perception that the EA provided a solid foundation to build upon, as well as both residents and coaches noting that the residents appeared more prepared for the coaching session [Q10]. A coach noted that residents' openness in sharing the EA, which they considered to be something intimate, seemed to lay a foundation of mutual trust that contributed to the acceleration of the coaching process [Q11]. Furthermore, residents reported feeling a sense of familiarity and experienced that the coach already had a better understanding of who they are, resulting in less need for extensive exploration and, therefore, enabling them to reach the core of the matter more quickly with the coach [Q12]. Consistent with this, coaches reported referring to the EA during the coaching conversation, employing various components of the EA for this purpose [Q13].

As a caveat, coaches expressed concerns about potential negative effects of preconceived notions brought forth by the EA; however, in practice, they did not find this to be the case, a sentiment echoed by residents. Coaches also contemplated whether the coaching process might have been accelerated due to the instruction to conduct a single coaching session, deviating from their usual practice of multiple sessions.

Residents' and coaches' attitudes

We found that residents' and coaches' attitudes affected how the EA was used in the coaching process and its perceived value. While attitudes towards the EA varied among residents, ranging from questioning its credibility, maintaining a more neutral standpoint to attributing great value to the instrument, none exhibited reluctance to share the EA or use it during the coaching session [Q14-15]. A resident, for whom a longer period had passed since the EA, reflected that they had made considerable progress in their development since then, leading them to perceive the assessment as less relevant. Individuals who attributed greater value to the EA also appeared to emphasize it more while formulating their coaching questions. During the interviews, some residents reflected that they had previously associated the EA primarily with the selection process and did not consider it relevant for their professional development. However, their perspective shifted after the coaching with the EA, leading them to recognize and appreciate the EA as a learning instrument [Q16].

Coaches expressed distinct preferences for using specific EA elements in the coaching process, guided by their perceptions and past experiences. For instance, one coach favored focusing on motivational drivers, considering them central in the coaching process, while another leaned towards competencies due to their familiarity with the psychometric properties.

Discussion

This study revealed that the EA played a supportive rather than a leading role in the coaching process. Residents and coaches reflected that the EA supported the coaching process by facilitating residents' reflection and accelerating the process. We found that its use and perceived value were affected by residents' and coaches' preconceived notions about the EA. Specifically, some residents initially viewed the EA as tied to selection and only recognized it as a learning tool through the coaching, underscoring the importance of positioning the tool as a learning instrument.

Residents and coaches employed the EA in diverse ways, tailoring its use to the specific coaching questions and unique needs and preferences of each resident. Since learners can present a wide range of coaching questions and individual learning needs,[4] we intentionally refrained from providing explicit instructions on how to apply the EA in the coaching process to allow for personalized application. Our findings underscore that the EA can be applied in a flexible manner to align with coaches' individual styles and preferences and residents' unique learning needs. This personalized application of the EA aligns with the broader shift in postgraduate medical education towards more individualized training, where residents are encouraged to take an active role in shaping their own unique learning trajectories.[16-19] We observed that some residents readily perceived the EA as a valuable learning tool and effectively identified aspects within it that could be harnessed to address their coaching questions. However, others initially encountered difficulty in recognizing the EA's value for their coaching process, influenced by their attitudes and prior experiences with the tool as part of the selection procedure. This demonstrates that learners' attitudes towards such tools can be influenced by how they are introduced, i.e., with an emphasis on meeting summative selection standards versus on promoting professional development. We argue that when educational institutions choose to implement comparable tools, they also bear the responsibility of guiding residents in using them effectively for their learning trajectories. Our findings emphasize the importance of explicitly positioning these tools as learning instruments and offering guidance on how they could be applied. We propose that program directors play a pivotal role in encouraging residents to seize the learning opportunities these tools provide.

It has been argued that for coaching to be effective, multiple sessions may be necessary.[9] However, review studies did not identify a significant correlation between the number of coaching sessions and coaching outcomes, which has been attributed to differences in coaching approaches.[1,9] In our study, both residents and coaches noted that the EA accelerated the coaching process by supporting their preparations, fostering mutual trust, and minimizing the need for extensive exploration. This enabled them to delve into deeper aspects more rapidly, even within a single coaching session. Concerns regarding the risk of making overly great leaps in the coaching process or harboring preconceived notions were raised but were not substantiated by participant experiences. These findings suggest that tools providing comprehensive insights into learners' characteristics and motivational drivers may hold potential to reduce the required duration of coaching interventions. This seems of particular interest in the context of postgraduate medical training, where budget and time constraints may restrict coaching opportunities.

While this study provides valuable insights into the value of using a selection assessment for professional coaching for residents' professional development, it is important to acknowledge its limitations. Our study may have been influenced by selection bias, as it's probable that only residents and coaches who were open to using this tool chose to participate. Seven residents were lost to follow-up, although they had initially provided informed consent for coaching with the EA. Due to ethical constraints, we were unable to explore the cause of their withdrawal. Despite this limitation, we did observe a variety of attitudes toward the EA among the resident participants. Furthermore, we intentionally allowed participants to tailor their coaching session according to their individual needs and preferences. While this decision aligned with the principles of individualized training, it may pose challenges to the transferability of our findings due to the heterogeneity of the coaching sessions. Additionally, this study was conducted in a single context, and we acknowledge that our findings may be culturally dependent. Furthermore, it should be acknowledged that the tool we employed was already implemented as part of the selection procedure. Introducing a novel assessment tool into the training curriculum would likely incur additional costs.

Although this study did not aim to quantitatively assess the effectiveness of using the EA for coaching or its potential to dimmish the required duration of coaching interventions, future research could explore this to form a perspective regarding the cost-benefit implications of applying such tools in educational practices. Additionally, further research could explore how coaches and residents can effectively employ the various other learning tools offered by the workplace and in the training curriculum, and comparing and contrasting different methods of applying the EA in coaching could yield valuable insights. Understanding when and why certain tools are valuable in specific coaching scenarios will contribute to a more comprehensive understanding to form evidence-informed recommendations to shape coaching practices in postgraduate medical training.

Conclusions

The intelligence, personality, motivation and competency selection assessment played a supportive but non-prominent role in the professional coaching of residents. Its supportive value included fostering self-reflection and accelerating the coaching process within a single coaching session. Residents' and coaches' attitudes affected the use and perceived value of the tool, highlighting the importance of its positioning in the training curriculum in transforming its use from a selection to a learning tool.

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Appendix 1
Interview guide residents 1 week after coaching session

Opening questions

- What do you remember about the coaching?
- How did you experience the coaching?

Core questions

- What did coaching with the e-assessment mean to you?
- What role did the e-assessment play for you in that?
- In what ways did you use the e-assessment in the coaching?

- What insights did you gain from using the e-assessment in the coaching?
- What did you learn from the coaching with the e-assessment?
- Did you change anything in your behavior as a result of the coaching with the e-assessment?
- Did you change anything about your work / postgraduate training as a result of the coaching with the e-assessment?
  If yes, what and why? If no, why not?
- Did the coaching with the e-assessment change your perspective about your work / postgraduate training?
  If yes, how and why? If no, why not?

  Follow-up questions:
  Why is that?
  What about the e-assessment played a role in that?
  Can you explain that?
  Why is that (not) so?
  How exactly does that work for you?

Closing questions

- What other feedback would you like to give to the postgraduate training program regarding the use of the e-assessment for coaching during postgraduate training?
- Do you have any further questions or remarks?
- Do you feel like you were able to tell us everything?

Appendix 2
Interview guide residents 3 months after coaching session

Opening questions

- What do you remember about the coaching?
- How do you look back on the coaching now?

Core questions

- What did coaching with the e-assessment mean to you in the past months?
- What role did the e-assessment play for you in that?
- In what ways did you use the e-assessment in the past months?

- What insights did you gain from using the e-assessment in the coaching?
- What did you learn from the coaching with the e-assessment?
- Did you change anything in your behavior as a result of the coaching with the e-assessment?
- Did you change anything about your work / postgraduate training as a result of the coaching with the e-assessment?
  If yes, what and why? If no, why not?
- Did the coaching with the e-assessment change your perspective about your work / postgraduate training?
  If yes, how and why? If no, why not?

  Follow-up questions:
  Why is that?
  What about the e-assessment played a role in that?
  Can you explain that?
  Why is that (not) so?
  How exactly does that work for you?

Closing questions

- What other feedback would you like to give to the postgraduate training program regarding the use of the e-assessment for coaching during postgraduate training?
- Do you have any further questions or remarks?
- Do you feel like you were able to tell us everything?

Appendix 3
Interview guide coaches focus group

Opening questions

- How did you experience coaching residents with the e-assessment?

Core questions

- How did you use the e-assessment in the coaching process?
  - *How would that go without the e-assessment?*
  - *How did you use the e-assessment in the preparatory phase?*
  - *How did you use the e-assessment during the session?*
- What value did the e-assessment have for the coaching?
- Does the e-assessment change the way you go into the coaching session?
- Did you notice any effect of using the e-assessment on how the resident went into the coaching session?
- Did you notice any value using the e-assessment had for the resident in the coaching?
- Did you notice any difference between residents in the value the e-assessment had for them?
- To what extent did you feel the e-assessment correctly represented the residents' attributes?

  Follow-up questions:
  Why is that?
  What about the e-assessment played a role in that?
  Can you explain that?
  Why is that (not) so?
  How do other coaches feel about this?
  How did that go for other coaches?

Closing questions

- What is for you the most important difference between coaching with the e-assessment and coaching without the e-assessment?
- What other feedback would you like to give to the postgraduate training program regarding the use of the e-assessment for coaching during postgraduate training?
- Do you have any further questions or remarks?

CHAPTER 7

General discussion

General discussion

Postgraduate medical education plays a pivotal role in preparing healthcare professionals to meet the challenges and changes in health and healthcare. In this thesis, we address two complex challenges in postgraduate medical education:

I. The growing complexity of healthcare requires collaboration among health professionals, but silos in healthcare and training programs challenge effective collaboration across disciplinary boundaries. In **Part I**, we delved into intraprofessional workplace learning (i.e., the learning that occurs when two or more disciplines within the same profession are engaged in learning about, from and with each other to enable effective collaboration and improve health outcomes), with the ultimate goal of enhancing collaborative practice for high-quality patient care.
II. Changes in healthcare place increasingly high demands on health professionals, who need to continuously self-assess and invest in their professional development to effectively address patient care needs, while maintaining personal wellbeing. **Part II** focused on investigating the value of an intelligence, personality, motivation, and competency selection assessment (EA) for residents' professional development, aiming to better harness its learning potential.

In this general discussion, we begin with an overview and critical review of the main findings, incorporating recommendations for practice that can be drawn from these findings. Subsequently, we present some methodological considerations. The chapter concludes with a review of the recommendations for practice, including insights into practical actions initiated based on this doctoral work, and a discussion of potential directions for future research.

Overview and critical review of main findings

Part I: Intraprofessional workplace learning

To advance our understanding of intraprofessional workplace learning, we started with a scoping review to identify existing knowledge on learning activities, learning outcomes, and influencing factors (**Chapter 2**). Next, we conducted individual and focus group interviews to explore intraprofessional workplace learning in the complex environment of tertiary pediatric care at the Radboudumc Amalia

Children's Hospital (**Chapter 3**). To uncover underlying processes that remained concealed in other studies, we then employed focused ethnography, studying everyday intraprofessional interactions to gain deeper insights into residents' lived experience (**Chapter 4**).

These studies have not only yielded extensive insights into the diverse factors at various levels influencing intraprofessional workplace learning but have also delved deeply into the intricate dynamics of how these factors manifest and interact, illuminating underlying processes at play. In the following paragraphs, we discuss our findings in detail through the lens of learner agency and workplace affordances.

Learner agency and workplace affordances in intraprofessional workplace learning

Reflecting on our findings, we found resonance with Billett's conceptualization of workplace learning.[1-3] This conceptualization emphasizes that participation in work and learning are inseparable.[1-4] According to Billett, the workplace shapes learning through the opportunities it affords learners to engage in activities and the direct and indirect guidance that learners are provided (workplace affordances).[1,2] Importantly, he emphasizes that learning is not solely determined by these opportunities; learner agency, rooted in personal interest and intentionality, plays a crucial role.[2-4] Billett states that workplaces "need to be understood as something negotiated and constructed through interdependent processes of affordance and engagement", emphasizing the intricate relationship between what the workplace offers (affordances) and how learners engage with it.[3] In the next paragraphs, we draw on our findings to shed light on the role of learner agency and workplace affordances in intraprofessional workplace learning.

Learner agency in intraprofessional workplace learning

Our research revealed that learner motivation is a key factor in residents' tendency to display agentic behavior for intraprofessional workplace learning. Particularly noteworthy within the context of intraprofessional collaboration, we observed that residents' identification and their desire for belonging with specific groups influenced their motivation and readiness for intraprofessional learning. For instance, in **Chapter 4**, we observed situations in which residents from closely related specialties engaged in frequent interactions and explicit learning, while in similar situations that involved residents from less closely related specialties, interaction was notably scarce. Another noteworthy finding was that residents and supervisors in their intentional learning behavior seemed primarily focused

on knowledge acquisition, and there appeared to be a shared perception that collaboration, in contrast, was not something that needed to be intentionally learned (**Chapter 3 and 4**). An essential condition for learners to demonstrate agency was their situational awareness of learning opportunities. We found that learning opportunities were often not initially recognized due to various factors, including one's limited mental capacity in a demanding work environment and a general lack of attention to intraprofessional learning (**Chapter 2-4**). These findings align with Billett's theory, emphasizing that effective learning is personally mediated through agentic action and engagement with workplace activities.[3,4] He recognizes that "individuals have to want to engage actively, including deliberately seeking to improve performance".[4] Our studies expanded on this theory by elucidating important factors influencing learner agency in intraprofessional workplace learning.

Workplace affordances in intraprofessional workplace learning

Our research demonstrated that the organization of work plays an important determining role in what learning opportunities residents can engage in. Factors such as task and role allocation were pivotal, for example: in determining whether residents would attend multidisciplinary meetings and, if so, whether they would attend as passive observers or as active contributors; or whether residents participated in intraprofessional consultations (**Chapter 2-4**). Workload and complexity of care had a substantial impact on residents' readiness for learning (**Chapter 2-4**). Furthermore, the spatial configuration and logistical processes within the hospital influenced the ease with which specialties could interact and collaborate, thereby affecting interactions in the workplace (**Chapter 3**). Additionally, system-level factors, such as healthcare and educational policies, exerted influence on the affordances within the clinical learning environment (**Chapter 2 and 3**).

Supervisors played a crucial role, acting as gatekeepers for residents' access to intraprofessional learning opportunities and their allowed level of active engagement (**Chapter 2-4**). In **Chapter 4**, we observed instances where their actions facilitated residents' participation, e.g., by encouraging them to actively engage in intraprofessional meetings, whereas in other instances supervisors completely bypassed residents in such opportunities. Furthermore, supervisors played a vital role in determining the norms and practices of the clinical environment, shaping residents' perceptions of available opportunities (**Chapter 4**). Supervisors also served as role models for residents, yet explicit guidance of intraprofessional workplace learning or reflection on intraprofessional care was noticeably absent (**Chapter 3 and 4**).

The complex and dynamic interplay between learner agency and workplace affordances

In line with Billett's conceptualization, our work illustrated that intraprofessional workplace learning is shaped by a complex and dynamic interplay between learner agency and workplace affordances.[1-3] We observed instances where residents took proactive steps to expand workplace affordances, such as initiating learning conversations or actively seeking out specific tasks (**Chapter 4**). Conversely, workplace affordances could support or hinder residents' learning. In **Chapter 4**, we described that residents' agency is not only affected by tangible workplace affordances, such as task allocation, but also by their preconceived ideas about learning and intraprofessional collaboration, their interpretation of the norms and practices of the clinical environment and what opportunities they *believed* they were granted by the workplace. Interestingly, previous experiences with other specialties shaped their expectations regarding future interactions and residents adapted their behavior accordingly. These findings resonate with Evans' concept of bounded agency (2007), which highlights that agency is a socially situated process bound by "past and imagined future possibilities, which guide and shape actions in the present, together with subjective perceptions of the structures [learners] have to negotiate".[5] We found that the perceived bounds on residents' agency were largely dictated by intangible workplace affordances, such as the prevailing learning culture, workplace norms, and safety, as opposed to more tangible aspects like task allocation. This implies that solely emphasizing the expansion of tangible workplace affordances or the encouragement of learner agency is inadequate to enhance intraprofessional learning in clinical practice; instead, a comprehensive approach is required that encompasses not only tangible workplace affordances but also intangible factors to achieve meaningful improvements.

Contextualizing our results within the existing literature

Our studies expand upon the broader research field regarding learning across disciplinary boundaries in healthcare, shedding light on the underexplored domain of intraprofessional learning. Our findings on intraprofessional workplace learning show similarities with the interprofessional workplace learning literature, suggesting lessons can be shared between these domains. These commonalities include aspects such as the role of learner and faculty attitudes, lack of awareness of learning opportunities, organization of work and workload, and health care and educational policies. Nonetheless, our research has also uncovered aspects that may be unique to intraprofessional learning. For example, in **Chapter 4** we observed that negative perceptions about other specialties posed challenges to

intraprofessional collaboration and learning. When viewed through the lens of the 'ingroup projection model', this phenomenon may stem from a tendency to project one's own specialty identity as the correct image for the shared overarching identity as a physician,[6] leading to dissonances and decreased interest in interacting with and learning from each other. This may distinguish intraprofessional collaboration from interprofessional collaboration, as differences between professions may be perceived as less threatening to the ingroup's professional identity and can be observed more neutrally.[6] Furthermore, findings from **Chapter 4** illustrated how the overlapping medical responsibilities between specialties can lead to tensions and conflict, in contrast to interprofessional collaboration where distinct professional responsibilities are more clearly defined. These findings suggest there may be merit in recognizing intraprofessional learning as a related but distinct domain deserving of dedicated attention.

Furthermore, our studies make a significant contribution to the limited research base on intraprofessional learning. Existing research primarily concentrated on intraprofessional learning between primary and secondary care physicians or on rotations where individuals learn by assuming roles from different professions.[7-9] In contrast, our research delved into intraprofessional workplace learning within the hospital context where individuals engage in learning while acting from their own professional roles, filling a gap in this understudied research area. Our research has contributed novel and valuable insights, including the complex ingroup and outgroup dynamics between hospital specialties, the challenges posed by the high complexity of intraprofessional care, and the pivotal role played by the resident-supervisor dyad. Additionally, we have deepened our understanding of how residents engage in intraprofessional workplace learning, shedding light on the complex dynamics between their agency and workplace affordances.

Unlocking the intraprofessional learning potential of the workplace

To enhance intraprofessional learning for effective collaborative practice, it is crucial to implement efforts to ensure that learning opportunities in the workplace are more readily recognized and more effectively utilized. This requires attention to both learner agency and workplace affordances. Our findings point to several directions that could help unlock the intraprofessional learning potential of the workplace, including stimulating deliberate intraprofessional learning, cultivating a safe intraprofessional learning environment, shifting focus from individual specialties to embracing team identity, and emphasizing collaborative and patient-centered care.

Stimulating deliberate intraprofessional learning

Our studies illustrate that without deliberate attention, the intraprofessional learning potential remains underrecognized and underrealized. A central hampering factor was the task-focus of residents and their environment. In **Chapter 4**, we observed that, burdened by heavy workloads, residents often prioritized managing daily patient tasks over their involvement in intraprofessional care. Furthermore, communication between specialties was task-focused and concise, lacking reflection or explicit attention to what could be learned from the interactions (**Chapter 4**). Our scoping review (**Chapter 2**) revealed that studies embedding reflection within the learning interventions held the greatest potential for positively influencing behavior in clinical practice. Likewise, in **Chapter 4** we observed that the study interviews triggered reflections that enhanced residents' awareness of learning opportunities and their understanding of what they had learned. We propose that explicitly labeling learning opportunities and creating more space for individual and collective reflection are essential to transition from a production to a learning environment. The finding that supervisors do not feel adequately prepared to support residents' development of collaboration competencies, as identified in our scoping review (**Chapter 2**), underscores the need for organizations to invest in faculty development in this area. Moreover, integrating intraprofessional learning into the training and assessment criteria of residency curricula may not only expand workplace affordances but also motivate supervisors and residents to actively engage in intraprofessional workplace learning (**Chapter 3 and 4**).

Recommendations for practice:

Strategic level

- Incorporate intraprofessional learning into training, feedback, and assessment criteria of residency training programs.
- Align and coordinate residency training curricula between specialties.

Organizational level

- Optimize the organization of work to facilitate residents' active participation in intraprofessional learning opportunities.
- Create space for individual and collective reflection on collaborative care.
- Invest in faculty development to prepare supervisors to facilitate residents' intraprofessional learning.

Individual level

Supervisors

- Explicitly label intraprofessional learning opportunities and encourage residents to capitalize on them.
- Stimulate and support residents' reflection on intraprofessional learning experiences.

Residents

- Proactively seek out and engage with intraprofessional learning opportunities.
- Engage in explicit reflective practice to enhance intraprofessional learning.

Cultivating a safe intraprofessional learning environment

The importance of a safe environment for both learning and the quality and safety of patient care has been widely acknowledged,[10-13] which was also underscored in our studies on intraprofessional learning (**Chapter 2-4**). Edmonson's research illustrated the significant impact of psychological safety on learning behavior within teams, underlining that individuals need to perceive the team environment as safe enough to be willing to take interpersonal risks, such as sharing their perspective, asking questions, and seeking feedback.[10] Consistent with Edmondson's work, in **Chapter 4**, our observations and interviews revealed that residents weigh multiple factors when deciding whether and how to speak up in intraprofessional teams. These factors included their level of certainty about an issue; who's area of expertise they believed the issue to be in; the importance of the issue for the patient; the perceived appropriate hierarchical level to address the issue; their interpersonal relationship; the perceived likelihood of a positive outcome; and the potential risk of negative effects on their professional reputation or the risk of causing intraprofessional conflict. Notably, the perceived safety in speaking up was shaped not only by the current situation but also influenced by past encounters with

different specialties, even when different individuals were involved in the current team. This connection in our findings between bounded agency and psychological safety adds a deeper layer of understanding to the complexities of intraprofessional learning dynamics. Moreover, drawing on interviews with residents in **Chapter 4**, it seems probable that the context of intraprofessional care may introduce an extra layer of complexity to speaking up, as residents appeared to be concerned not only about their own interpersonal risks but also about the potential adverse impact on the reputation of their entire specialty.

Another interesting reflection from our studies, is that professionals appeared far more invested in creating a safe learning environment and encouraging the learning of learners within their own specialty, as opposed to learners from other specialties (**Chapter 3 and 4**). These findings are consistent with prior research indicating that members of the interprofessional care team determine if they are willing to invest in resident's learning based on their judgement of the resident's intentions.[14] When residents were perceived as transient collaborators, the healthcare team tended to show less interest in investing in their learning compared to learners perceived as long-term community members.[14]

In summary, we underscore the importance of psychological safety in improving intraprofessional learning in the pursuit of high-quality collaborative care. This endeavor demands a collective effort involving all members of the intraprofessional care team.

Recommendations for practice:

Organizational level

- Actively and continuously invest in building positive relationships between specialties, dismantling any existing negative perceptions that hinder a safe and supportive intraprofessional learning environment.

Individual level

Supervisors

- Cultivate a safe learning environment, ensuring that it benefits not only learners within their own specialty but also extends to learners from other specialties, regardless of the duration and intensity of their engagement.

Residents

- Recognize own vital role in daring to take interpersonal risks to create learning opportunities and contribute to improved and safer collaborative care.

Shifting focus from individual specialties to embracing team identity
Professional identity formation is increasingly being recognized as a fundamental objective of health professions education.[15-17] Professional identity formation in medicine is a dynamic process achieved through socialization through which learners come to "think, act, and feel like a physician".[18] Thus far, efforts in the field of professional identity formation have centered around acquiring a specialty-specific professional identity, overlooking that a more broad identity may be required to become a collaborative professional in the landscape of healthcare practice.[19,20]

Our studies offer valuable insights into the underlying processes in current practice and provide suggestions for enhancing a more comprehensive professional identity formation. Cruess et al. (2015) emphasize the powerful role of role models and of clinical experiences in professional identity formation.[18] Hence, we will focus our attention on what can be learned from our studies regarding these two aspects.

Our studies provide insights into the collaborative culture that residents adopt through clinical experiences, raising some key areas for improvement. In **Chapter 4** we observed that, at times, professionals demonstrated an us-versus-them mentality, resorting to stereotypes, shifting responsibilities without shared understanding, and lacking mutual reflection. While differences in perspective could offer fruitful learning opportunities, these were not always openly discussed, leading to intraprofessional conflicts, reinforcing stereotypes, and avoiding behavior. These conflicts left residents feeling uncertain and unmotivated to engage further in intraprofessional interactions. In the absence of proper guidance and reflective support towards desired learning for enhanced collaborative care, there is a risk that residents adopt and internalize the unconstructive behaviors they observe in clinical practice. It is, therefore, imperative to address the collaborative culture, and to provide residents with guidance and reflective support in navigating and learning from intraprofessional challenges, to foster learning towards enhanced collaborative care.

Our field observations (**Chapter 4**) revealed that residents predominantly regarded supervisors from their own specialties as role models, rather than considering those from other specialties. Thus, residents adjusted their behavior to their perceptions of the norms and practices of their supervisor. Cruess et al. (2015) assert that learning from role models involves both conscious reflection and an unconscious process of adopting behaviors displayed by role models.[18]

They underscore the importance of guided reflection and explicit modeling by role models to avoid the potential reinforcement of undesirable behaviors.[18] In our field observations (**Chapter 4**), guided reflection and explicit modeling were infrequently employed, indicating an opportunity for a more constructive use of role models for intraprofessional learning. Furthermore, our findings suggest a worthwhile endeavor could involve expanding residents' learning from other specialty role models to enrich their development towards collaborative practitioners in the increasingly interdependent healthcare landscape.[21]

Recommendations for practice:

Strategic level

- Promote a more holistic approach to professional identity formation by recognizing the importance of developing a broader identity as health professional beyond specialty-specific communities of practice.

Organizational level

- Proactively address unconstructive collaborative cultures.

Individual level

Supervisors

- Delineate, communicate, and model behavior towards enhanced collaborative care.
- Stimulate residents to seek out and utilize role models and mentors from different specialties to broaden their perspective.
- Actively guide residents in navigating intraprofessional challenges and stimulate and support residents' reflection on these experiences.

Residents

- Proactively seek out and utilize role models and mentors from different specialties to broaden own perspective.

Emphasizing collaborative and patient-centered care

In **Chapter 4**, we observed that intraprofessional decision-making processes predominantly involved discussing individual specialty viewpoints, with one often being prioritized as the most knowledgeable, instead of embracing a more holistic view that incorporates perspectives from multiple specialties, including the crucial viewpoint of the patient. Furthermore, we noticed a lack of collective reflections on collaborative care, with reflections tending to be unilateral rather than a shared endeavor. Additionally, reflections were predominantly outcome-oriented, neglecting the importance of including insights on the collaborative process itself. Importantly, a notable absence was the patient's involvement in

intraprofessional interactions. In conclusion, there is a pressing need to promote a shift towards process-oriented learning and to incorporate a broader range of feedback sources, particularly from patients and intraprofessional colleagues, in order to foster collaborative patient-centered care.

Recommendations for practice:

Organizational level

- Actively encourage shared reflection on collaborative patient-centered care, moving beyond unilateral and outcome-oriented reflections.

Individual level

Supervisors

- Facilitate residents' learning from the collaborative process and a broad range of feedback sources, including patients and intraprofessional colleagues.

Residents

- Proactively seek feedback from a broad range of sources, including patients and intraprofessional colleagues.

Part II: Learning from a selection assessment

In **Part II** we investigated the value of an intelligence, personality, motivation, and competency selection assessment (EA) for residents' professional development. We first explored the perceived learning value of the EA from the perspective of pediatric residency applicants and the factors influencing this (**Chapter 5**). To enhance the uptake of the EA as a tool to support residents' professional development, we introduced a coaching pilot, investigating its perceived value for coaching from the perspective of residents and coaches (**Chapter 6**).

These studies have provided insights into the learning value of the selection assessment and identified factors hindering its utilization as a learning instrument. Moreover, they have shed light on potential steps that could enhance residents' learning from the selection assessment. In the following paragraphs, we discuss our findings in more detail.

The learning potential of the selection assessment

The learning value of assessments for selection for postgraduate medical training has thus far been underexplored in the literature, likely resulting in the underutilization of their learning potential.[22-26] To our knowledge, our studies

are the first to demonstrate the learning potential of a selection assessment for residents' professional development. Specifically, the EA supported applicants' and residents' self-reflection, resulting in heightened self-awareness (**Chapter 5 and 6**). It instigated the setting of new development goals and aided in their assessment of what they needed to excel as professionals in their current and future practice (**Chapter 5 and 6**). Furthermore, it could also foster accepting one's inherent qualities and pitfalls, contributing to overall professional contentment (**Chapter 5 and 6**).

Our findings suggest that the EA holds potential to support job crafting, which is defined as individuals' efforts to craft the boundaries or conditions of their job to align with their own abilities, preferences and wishes to increase their work meaning and goal attainment.[27,28] In **Chapter 5**, applicants for pediatric residency training expressed that their enhanced understanding of their motivational drivers could assist them in actively pursuing job aspects that resonate with their personal interests and could be valuable to rekindle motivation during challenging periods in their careers. Moreover, in the coaching study's (**Chapter 6**) second interview after three months, some residents reported adjusting elements of their job to better match their individual needs and preferences. For instance, some actively sought out specific tasks aligned with their newly defined developmental objectives, while others chose to relinquish unnecessary tasks that did not align with their objectives and were draining their energy. These findings hold particular relevance amid the current epidemic of physician distress,[29-32] as job crafting has been linked to increased employee well-being and job performance.[27] It also resonates with the broader trend in postgraduate medical education towards more individualized learning trajectories, where residents are encouraged to find their own unique path and develop a distinct profile, such as healthcare innovation or education, to collectively address the ever-changing societal needs .[33-38]

Unlocking the learning potential of the selection assessment

While these findings are promising, it became evident that the EA's role as a selection instrument overshadowed its learning potential. This issue surfaced not only in our interviews with applicants (**Chapter 5**) but also continued to influence residents' attitudes toward the assessment during their residency training, as revealed in our coaching pilot study (**Chapter 6**). Engaging in dialogue with the HR advisor, coach, or even, the study interviewer proved instrumental to recognize and harness the learning value, and applicants and

residents primarily believed that the tool would be valuable to use in the future when engaging in dialogue with their residency training supervisor or coach (**Chapter 5 and 6**). Taken together, these results underscore the importance of also framing the tool as a learning instrument and integrating meaningful dialogue about it in the training curriculum. Without this intentional approach, the learning potential of the EA remains tragically unrealized and untapped.

An effort to promote learning based on the EA that had been implemented prior to this thesis involved encouraging applicants to reflect on their EA results with the HR advisor and within their reflective reports. However, our findings revealed that applicants were primarily preoccupied with what the selection committee would want to hear (**Chapter 5**). Based on our research, it appears unlikely that their reflections within the reflective report are fully authentic.[39] So, while the idea of trying to foster learning from the outset may seem opportune, it appears that the selection phase, with its high stakes nature, is not the most suitable time for fostering authentic learning. In light of these findings, we recommend refraining from attempting to promote learning *during* the selection procedure. Indeed, while it remains important to emphasize during the selection procedure that it serves as both a selection and learning tool to enhance its framing as a learning instrument, the focus should shift towards fostering its value for professional development through integration within the training program, when residents can learn more authentically in a less high-stakes environment.

In conclusion, the EA's learning potential remains unfulfilled amid its role as a selection tool. To bridge this gap, reframing it as a learning instrument and fostering meaningful dialogue within the training curriculum are essential for its value for residents' professional development to be realized.

Recommendations for practice:

- Clearly articulate the dual role of the EA as both a selection and a learning tool from the outset.
- Alleviate concerns about acceptability and credibility of the EA by explaining its purpose and psychometric qualities.
- Focus efforts on fostering the EA's value for professional development within the training curriculum rather than attempting to promote learning during the high-stakes selection procedure.
- Actively encourage residents to utilize the EA as a tool to support their reflective practice and professional development.
- Integrate meaningful dialogue about the EA in the training curriculum, for instance, incorporating it into progress meetings with residency training supervisors or coaching sessions.

Methodological considerations

This thesis was built on a constructivist research paradigm, employing qualitative methods as they were considered best suited for addressing our research questions.[40] A strength of our approach was that, rather than adhering to a single theory, our research was enriched by drawing insights from diverse theories on workplace learning. Learning is a complex phenomenon; drawing from different theoretical approaches allowed us to see this complex phenomenon in a broader light.[41,42] Furthermore, our research team brought together diverse backgrounds, expertise and experiences. We intentionally engaged in discussions from our diverse perspectives to allow for a multifaceted exploration of the phenomena, in line with the constructivist paradigm.[40,43] We further enriched our research by involving various stakeholders in the different studies. This included for example a sounding board group comprising patients, residents, supervisors and educational researchers in **Chapter 4**, and the participation of a resident and a coach within our research team in **Chapter 6**. These brought valuable perspectives and insights, contributing to the richness and practical translation of our findings.

During the interviews, we found that, at times, participants' perceptions about learning were restricting our exploration of what had been learned, as what we considered as learning was not always recognized as such by the participants themselves. When asked directly *'what did you learn?'*, some participants

claimed they had not learned anything. However, rephrasing questions, such as *'how did you change your approach based on this experience?'* or *'how did this experience change your perspective on …?'* revealed that learning had indeed occurred. It appears that people's current associations with the term 'learning' do not encompass the entire scope of learning from our perspective of workplace learning but refer to a more narrow perspective focusing on acquiring medical knowledge. Piloting and iteratively adapting interview guides have been crucial in this research to overcome this challenge.

Furthermore, it is important to acknowledge that learning is a highly complex process, which is impossible to fully capture through research methods. Although observations can capture observable behaviors, and interviews offer insights into conscious thought processes that participants are willing to share with the interviewer, the nuances of what precisely occurs within an individual's mind, including implicit learning, will always remain elusive to the researcher. A lack of observable evidence of learning does not necessarily mean that meaningful learning did not occur. Consequently, we recognize that our studies can never entirely capture the complexity of learning processes, particularly those that are implicit and not overtly expressed in observable behaviors or conscious reflections. While recognizing these constraints, our studies represent a comprehensive effort to deepen our understanding of the intricate learning processes within residency training. Through our efforts, we aim to provide valuable and actionable insights that can guide efforts to support residents' learning.

All of the empirical work in this thesis was conducted within the context of the Radboudumc Amalia Children's Hospital or the East-Netherlands Postgraduate Training Region. It is crucial to recognize that our findings are inherently influenced by the unique characteristics of this context, including its culture, organizational structures, and training program. We acknowledge that this has inevitably shaped our results and affects the transferability of our findings. By offering an in-depth description of the research context and our findings, we aimed to provide researchers with the necessary insights to translate our findings to their own situation. To foster a broader and more nuanced understanding of the studied phenomena, we encourage fellow researchers to explore how our findings resonate within their own unique contexts.

The way forward

Practical implications

This doctoral research holds relevance for various stakeholders within the healthcare and health professions education landscape. Our results can provide insights to residents, offering them guidance in optimizing their learning experiences. Supervisors can benefit from our findings to enhance the guidance they provide. Program directors and educational managers can gain valuable insights to inform the design of training curricula and clinical learning environments. Organizational managers can understand how the organization of the work environment affects learning. Additionally, policymakers can leverage our research to shape policies that promote collaboration and meaningful learning experiences in clinical care. In the following paragraphs, we recapitulate the recommendations for practice that can be drawn from our findings. Additionally, we discuss actions we initiated, guided by our research insights, to bring about positive changes in clinical practice.

Part I: Intraprofessional workplace learning

Altogether, our findings demonstrate that a transformative cultural shift is required to foster intraprofessional workplace learning towards enhanced collaborative care. While learner agentic action remains pivotal, the burden to create and harness learning opportunities cannot be solely placed on the shoulders of residents.[5,44] Instead, we advocate for a multi-tiered approach that implements interventions at various levels to bring about meaningful improvements. Our research provides actionable insights for steps that can be taken at the strategic, organizational, and individual level:

Strategic level

- Incorporate intraprofessional learning into training, feedback, and assessment criteria of residency training programs.
- Align and coordinate residency training curricula between specialties.
- Promote a more holistic approach to professional identity formation by recognizing the importance of developing a broader identity as health professional beyond specialty-specific communities of practice.

Organizational level

- Optimize the organization of work to facilitate residents' active participation in intraprofessional learning opportunities.

- Create dedicated space and actively encourage individual and shared reflection on collaborative care, moving beyond unilateral and outcome-oriented reflections.
- Invest in faculty development, to ensure that supervisors are well equipped for their roles as facilitators, guides, and role models in collaborative care.
- Actively and continuously invest in building positive relationships between specialties, dismantling any existing negative perceptions that hinder a safe and supportive intraprofessional learning environment.
- Proactively address unconstructive collaborative cultures.

Individual level

Supervisors

- Explicitly label intraprofessional learning opportunities and facilitate residents' active participation, guiding residents in navigating challenges or highly complex care.
- Encourage residents to learn from the collaborative process: stimulate and support their reflection on intraprofessional learning experiences, and encourage them to embrace a broad range of feedback sources.
- Cultivate a safe learning environment, ensuring that it benefits not only learners within their own specialty but also extends to learners from other specialties, regardless of the duration and intensity of their engagement.
- Delineate, communicate, and model behavior towards enhanced collaborative care.
- Actively guide residents in navigating intraprofessional challenges and stimulate and support residents' reflection on these experiences.
- Stimulate residents to seek out and utilize role models and mentors from different specialties to broaden their perspective.

Residents

- Proactively seek out and engage with intraprofessional learning opportunities.
- Engage in explicit reflective practice to enhance intraprofessional learning and the professional formation towards collaborative health professional.
- Recognize own vital role in daring to take interpersonal risks to create learning opportunities and contribute to improved and safer collaborative care.
- Proactively seek out and utilize role models and mentors from different specialties to broaden own perspective.
- Proactively seek feedback from a broad range of sources, including patients and intraprofessional colleagues

Practical steps inspired by this doctoral work

Our research findings are currently being translated into practical interventions aimed at supporting intraprofessional workplace learning in the day-to-day clinical practice of the Radboudumc Amalia Children's Hospital. While previous efforts by other groups have primarily resulted in activities outside of daily practice, we focus our efforts on enhancing intraprofessional workplace learning within the everyday clinical learning and working environment. We firmly believe supporting learning in this context is the most effective way to drive meaningful change, especially considering the already overly saturated training curricula. To this end, we adopted a participatory action research approach to develop and evaluate interventions for intraprofessional workplace learning integrated in daily practice. The insights from this doctoral work serve as crucial guidance for this endeavor. Meanwhile, we are sharing and engaging with various stakeholders, including the Radboudumc Amalia Children's Hospital board, the Radboudumc Central Training Committee (COC) and national parties in the field of postgraduate medical training, to further disseminate our findings and ensure their meaningful impact on the broader healthcare and education communities.

Part II: Learning from a selection assessment

Our findings illustrated that the learning value of the EA is currently overshadowed by its role as a selection instrument, leaving its learning potential for residents' professional development untapped. Considering the substantial resources invested, it would be significant missed opportunity not to take action to ensure better utilization of the learning potential. Our findings suggest several courses of action at the training program level to better harness the EA's learning potential for residents' professional development:

- Clearly articulate the dual role of the EA as both a selection and a learning tool from the outset.
- Alleviate concerns about acceptability and credibility of the EA by explaining its purpose and psychometric qualities.
- Focus efforts on fostering the EA's value for professional development within the training curriculum rather than attempting to promote learning during the high-stakes selection procedure.
- Actively encourage residents to utilize the EA as a tool to support their reflective practice and professional development.
- Integrate meaningful dialogue about the EA in the training curriculum, for instance, incorporating it into progress meetings with residency training supervisors or coaching sessions.

Practical steps inspired by this doctoral work

Our research work brought about concrete changes in practice. A first illustration is **Chapter 6**, where we initiated a coaching pilot intervention to benefit the uptake of the selection assessment as a valuable learning tool. The insights from our studies were shared with the regional pediatrics training committee, leading to several policy changes. These changes include a more explicit presentation of the selection assessment as a learning tool during the selection process and its incorporation into progress meetings with the residency training supervisor. Furthermore, our research contributed to the integration of professional coaching into the training curriculum, where residents are actively encouraged to utilize the assessment as a supportive tool in the coaching process. Additionally, we extended our insights to various other interested groups, both to internal stakeholders within the Radboudumc and external parties, providing guidance and insights on selection assessments to support their endeavors.

Suggestions for future research

In this section, we outline several potential directions for future research. While we acknowledge that numerous paths exist to further expand upon our work, we will focus on those we consider the most promising or relevant. Additionally, we want to emphasize the importance of investigating our findings in diverse contexts, as this will contribute to a more comprehensive and robust understanding of the challenges addressed in this thesis.

Part I: Intraprofessional workplace learning

Understanding other perspectives

In this thesis, our primary focus was on the perspective of the residents. This approach was instrumental to gain a deep understanding of residents' lived experience. By immersing ourselves in the residents' viewpoints, we were able to delve deeply into their unique challenges, perceptions, and experiences. This allowed us to uncover nuanced insights that might otherwise have remained unnoticed. Future research could explore intraprofessional workplace learning from other perspectives, to foster a broader understanding. A voice that remains particularly unheard is the voice of the patient. Our observations in **Chapter 4** highlighted a lack of direct patient involvement in intraprofessional collaboration. We propose that exploring patients' viewpoints constitutes a crucial step in enhancing practice, to ensure that improvements align with the expectations and needs of the individuals receiving collaborative care.

Exploring intraprofessional learning over time
Our studies provide intriguing starting points towards more fundamental processes that play a role in intraprofessional learning, such as socialization, professional identity formation and the role of individuals' beliefs about learning. Because our studies were confined to a selected time period, we could not investigate how these aspects evolved over time. It would be particularly interesting to further explore these aspects through in-depth longitudinal research. Exploring how these fundamental processes unfold over time could offer a more nuanced understanding of the complex dynamics inherent in intraprofessional learning processes.

Improving intraprofessional workplace learning in practice
To achieve the transformative cultural shift required for improving intraprofessional workplace learning in practice, we adopted a participatory research approach to iteratively design and develop interventions for intraprofessional workplace learning that can be effectively integrated into daily practice. This collaborative methodology involves active engagement between researchers and practitioners, to bridge the gap between research findings and clinical practice. By actively involving those immersed in the intraprofessional healthcare environment, we can co-create interventions that align with the practical realities of daily clinical practice, to enhance the likelihood of sustainable improvements in intraprofessional workplace learning. Additionally, addressing practical challenges through this research approach may not only benefit practice but also unveil valuable scientific insights that remained undiscovered in our current studies.

Part II: Learning from a selection assessment
Integrating the selection assessment into the learning curriculum
Future research could explore and refine methods for integrating the EA into the educational curriculum. Our coaching intervention (**Chapter 6**) represented an initial step, but our findings suggest that a more integrated approach, rather than a separate coaching program, may further enhance the utilization of the EA as a learning instrument. We propose that a longitudinal study, tracking residents' professional development over time, may offer valuable insights into how the EA influences residents' professional development over time.

Fostering the selection assessment's potential in crafting individualized trajectories
Our findings suggest that the EA may hold potential to support residents in crafting their individualized trajectories. To expand on this potential, future research could delve deeper into the mechanisms through which the EA can

effectively contribute to job crafting among residents. This could yield valuable insights to inform the development of targeted interventions that empower residents to shape their learning trajectories according to their unique abilities, preferences, and aspirations.

Final remarks

This thesis addresses two complex challenges in postgraduate medical education. In essence, our research is about how residents can leverage learning opportunities for their professional development to prepare them to deal with the complex and ever-changing challenges of patient care. Much like the residents navigating their professional development, this endeavor has been my own personal journey of personal and professional development. The work presented here would not have been possible without being vulnerable, embracing challenges, engaging with different perspectives, and learning from experiences, with the support of colleagues. As a final reflection on the work presented in this thesis, I would like to share how this PhD journey has shaped my ideas about health professions education and research, and contributed to my professional growth.

Through this trajectory, I have gained a more profound understanding of the complexities of the clinical learning environment. It has heightened my awareness of the significant challenges we, as learners, have to face. It has helped me understand how implicit expectations and prevailing norms and practices – ones I too had always unquestioningly accepted – shape the actions of learners. Even with the best intentions, navigating the demands of daily tasks and the myriad responsibilities can make it challenging to engage in deliberate learning practices. This realization has fueled my commitment to exploring ways to better support learners. I am certain that the many lessons I learned will not only guide me in supporting others but will also prove invaluable in my own journey through pediatric residency training.

The studies in this PhD thesis are grounded in a constructivist research paradigm. Being trained and raised with a positivist worldview, adopting this new perspective on reality presented challenges at times. Nevertheless, through engaging in various courses and meaningful discussions with colleagues, I have embraced and internalized constructivism. I am delighted to have discovered the constructivist paradigm as it resonates far better with me as a person and with my research motivations. By acknowledging the importance of subjective

experiences and contextual considerations in shaping and co-constructing knowledge, this paradigm has allowed me to better connect our research and the complex realities of the clinical training environment.

Reflecting on my journey, I now realize there are many aspects I could have approached differently or improved in our studies. Embracing constructivism, means embracing that your research instrument – a.k.a. you – will never be 100% perfect, but that you will continuously reflect and improve. Engaging in reflexive discussions with colleagues both within and outside my research team has contributed significantly to my growth as a researcher throughout this entire experience. I am looking forward to further developing myself as a professional and researcher and supporting others' development in the opportunities yet to come.

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CHAPTER 8

Summary
Samenvatting

Summary

The changing healthcare landscape, marked by a surge in knowledge and technologies, heightened health problem complexity, and changing societal expectations, requires a transformation in health professions education. This transformation is crucial to adequately prepare health professionals to meet the evolving demands of healthcare. This PhD thesis is dedicated to the advancement of postgraduate medical education. **Chapter 1** sets the stage by introducing two complex challenges, serving as the central themes for the two parts of this thesis:

I. The rising complexity of healthcare requires effective collaboration across disciplinary boundaries, which is hampered by the siloed organization of healthcare and training programs. **Part I** of this thesis focuses on enhancing our understanding of intraprofessional workplace learning (i.e., learning from, with and about physicians of different medical specialties) in postgraduate medical education, aiming to better support residents' intraprofessional workplace learning, fostering collaborative practice and ultimately improving the quality of patient care.
II. The changing healthcare landscape places escalating demands on health professionals, necessitating continuous self-assessment and investment in professional development. **Part II** of this thesis focuses on understanding the value of an intelligence, personality, motivation, and competencies selection assessment for residents' professional development, aspiring to improve support for residents' learning from this assessment, enhancing their development and ultimately improving the quality of patient care.

Part I: Intraprofessional workplace learning

Through a scoping review, **Chapter 2** explores existing literature on residents' learning from workplace-related intraprofessional activities, investigating learning processes and outcomes, along with influencing factors. The chapter describes a spectrum of informal and formal intraprofessional activities, categorized under collaboration in clinical practice, rotations/placements, formal educational sessions, and simulated workplace training. In general, studies reported positive learner reactions, improved attitudes, knowledge and skills, and positive behavioral changes. No studies recorded changes in performance in practice. The reported learning outcomes include patient-centered care, collaborative attitudes and respect, mutual knowledge and understanding, collaborative decision making, communication, leadership, teamwork, and reflexivity. In this chapter, we identify a range of influencing factors deriving from the sociocultural

environment, the learner, and the learning context. Factors from the sociocultural environment include healthcare policy, the training curriculum, and the physical and technological infrastructures. Those related to the learner encompass prior experience and knowledge, motivation, and learner agency. The learning context includes factors that determine the exposure to intraprofessional collaboration, the learning climate, available supervision and guidance, and patient care needs. We conclude the chapter by advocating for acquiring more robust evidence and a deeper understanding of underlying mechanisms, and providing recommendations for advancing intraprofessional learning in clinical practice.

Chapter 3 investigates intraprofessional workplace learning in the complex environment of tertiary childcare at the Radboudumc Amalia Children's Hospital. Drawing on individual and focus group interviews with residents and supervisors from various specialties, we describe learning activities and influencing factors. Interviews with residents and supervisors revealed numerous learning activities related to patient care, but deliberate attention to intraprofessional learning often seemed lacking in clinical practice. We outline influencing factors at the system, organization, and personal and interpersonal level. Our findings suggest that system and organization level factors, such as healthcare and training policy, and the organization of work and complexity of care, mainly determine the emergence of intraprofessional learning opportunities, while person level factors, such as perceived relevance and awareness of learning opportunities, and interpersonal relationships, primarily influence the uptake of these opportunities. The chapter concludes that, while ample intraprofessional learning opportunities exist in complex tertiary care, making these opportunities more intentional and deliberate could benefit residents' learning. Based on the identified influencing factors across different levels, we offer targeted practical recommendations to enhance intraprofessional workplace learning by residents from complex tertiary care.

Prompted by the realization that the preceding studies, while informative, could not fully grasp the subtle underlying dynamics at play, in **Chapter 4**, we embark on a focused ethnographic study. Employing field observations and in-depth interviews with residents, we aim to unravel the underlying processes that play a role in intraprofessional workplace learning in residency training through exploring everyday interactions. We describe three key themes to shed light on underlying processes: residents' agency, requiring residents to recognize learning opportunities, want to engage, think that they can and may engage, and dare to engage; the role of ingroup and outgroup dynamics, manifested through

intraprofessional stereotypes, and impacting residents' sense of belonging and inclination to interact and learn from others; and task-focused communication about intraprofessional collaboration, resulting in unproductive disagreements and learning from unilateral perspectives. The chapter concludes by emphasizing that, although collaborative practice offers ample intraprofessional learning opportunities, deliberate efforts are required to better harness these opportunities towards improving collaborative care. We highlight the pivotal role of the resident-supervisor dyad and the importance of promoting deliberate practice and shared responsibility to better prepare residents for their roles in delivering high-quality collaborative patient care.

Part II: Learning from a selection assessment

We start our investigation of the learning value of the selection assessment by exploring the perceived learning value at the point of assessment administration. In **Chapter 5**, we delve into the perceptions of pediatric residency training applicants regarding the learning value derived from the selection assessment, and we examine what factors shape the experienced learning value. Through individual interviews, this study revealed that applicants considered the selection assessment valuable in fostering self-reflection and self-awareness, embracing self-acceptance, pursuing development goals, assessing professional fit, and harnessing motivational drivers in work. We found that the experienced learning value was influenced by applicants' ability to interpret its results, their focus on the high-stakes selection process and their concerns regarding the acceptability and credibility of the selection tool. In the discussion, we highlight that, although the selection assessment exhibits learning potential, its learning value is hampered by applicants' preoccupation with the high-stakes nature of the selection procedure. The chapter concludes by proposing the intentional integration of the selection assessment into the learning curriculum as a pivotal strategy for realizing its learning potential.

Recognizing the growing interest in professional coaching as an individualized intervention to support professional development of residents, **Chapter 6** describes a pilot intervention that entailed coaching residents with the selection assessment, aiming to also enhance the uptake of the assessment as a learning instrument. Through individual interviews with residents from various specialties and a focus group interview with coaches, we explore the experienced value of using the selection assessment for professional coaching in medical postgraduate training. We describe that residents and coaches considered the selection assessment a supportive but not leading tool in the coaching process, with its

supportive role laying in fostering residents' reflection and accelerating of the coaching process within a single coaching session. We found that the perceived value of the selection assessment for the coaching process was shaped by residents' and coaches' attitudes. Reflecting on our findings, we note their relevance in the current landscape of postgraduate medical education, with its broader shift towards more individualized learning trajectories, and where budget and time constraints may restrict coaching opportunities. We conclude the chapter by emphasizing the importance of explicitly positioning these tools as learning instruments and offering guidance on their application.

In **Chapter 7**, we conclude this thesis with an overview and critical review of our findings. We review our findings on intraprofessional workplace learning through the lens of learner agency and workplace affordances. Reflecting on our findings, we outline directions to unlock the intraprofessional learning potential of the workplace, including stimulating deliberate intraprofessional learning, cultivating a safe intraprofessional learning environment, shifting from individual specialties to embracing team identity, and emphasizing collaborative and patient-centered care. Next, we review our findings on the learning potential of the selection assessment, and we propose that the assessment holds the potential to support job crafting and the individualization of learning trajectories. We emphasize that without intentional focus on the learning potential of the selection assessment, it remains untapped, overshadowed by concerns related to its selection aspects. Reflecting on these insights, we suggest that it may be more fruitful to focus efforts on fostering the EA's value for professional development within the training curriculum rather than attempting to promote learning during the high-stakes selection procedure. Additionally, we propose strategies to unlock the learning potential of the selection assessment, highlighting the importance of framing it as a learning tool, fostering resident engagement, and incorporating meaningful dialogue into the training curriculum. After addressing methodological considerations, the chapter ends with recommendations for practice and potential directions for future research.

Samenvatting

De gezondheidszorg verandert snel door nieuwe kennis en technologie, complexere gezondheidsproblemen en veranderende maatschappelijke verwachtingen. Het is van groot belang dat de gezondheidszorgopleidingen hierop inspelen en vernieuwen. Deze verandering is cruciaal om zorgprofessionals goed voor te bereiden op de steeds veranderende zorgvraag. Dit proefschrift richt zich op de verbetering van de medische vervolgopleidingen, waarin basisartsen worden opgeleid tot medisch specialisten. Een arts in opleiding tot medisch specialist wordt ook wel aangeduid als aios.

In **Hoofdstuk 1** worden twee complexe uitdagingen geïntroduceerd, die centraal staan in de twee delen van dit proefschrift:

I. De toenemende complexiteit van zorg vereist effectieve samenwerking tussen artsen van verschillende specialismen. Dit wordt bemoeilijkt door de versnipperde organisatie van de zorg en de gezondheidszorgopleidingen. **Deel I** van dit proefschrift richt zich op intraprofessioneel werkplekleren in de medische vervolgopleidingen. Intraprofessioneel werkplekleren is het leren van, met en over artsen van verschillende medische specialismen (bijvoorbeeld kindergeneeskunde en chirurgie). Het doel is om meer inzicht te krijgen in het intraprofessioneel werkplekleren in de medische vervolgopleidingen. Met dat inzicht hopen we het intraprofessioneel werkplekleren van aios beter te kunnen ondersteunen, om zo de intraprofessionele samenwerking te bevorderen en uiteindelijk de zorgkwaliteit te verbeteren.
II. Het veranderende zorglandschap stelt steeds hogere eisen aan zorgprofessionals. Daarom is continue zelfreflectie en investering in professionele ontwikkeling essentieel. **Deel II** van dit proefschrift richt zich op de leerwaarde van een selectie assessment voor de professionele ontwikkeling van aios. Dit assessment meet intelligentie, persoonlijkheid, drijfveren en een set competenties. Tot op heden wordt het assessment alleen gebruikt om artsen te selecteren voor de medische vervolgopleidingen. Het doel is om te onderzoeken of het assessment ook kan worden ingezet als leerinstrument. Met dat inzicht hopen we het leren van aios door het selectie assessment beter te kunnen ondersteunen, om zo de professionele ontwikkeling van aios te bevorderen en uiteindelijk de zorgkwaliteit te verbeteren.

Deel I: Intraprofessioneel werkplekleren

In **Hoofdstuk 2** onderzoeken we bestaande wetenschappelijke literatuur over hoe aios leren van intraprofessionele activiteiten op de werkplek. Middels een scoping review brachten we leerprocessen, leeruitkomsten en beïnvloedende factoren in kaart. In de literatuur werd een spectrum aan leeractiviteiten beschreven, zoals samenwerken in de klinische praktijk, stages, formele onderwijsmomenten en simulatietrainingen. Over het algemeen rapporteerden studies positieve reacties van aios. Studies rapporteerden verbeteringen in de houding, kennis, vaardigheden en het gedrag van aios. We vonden echter geen onderzoeken die veranderingen in de klinische praktijk beschrijven. De leeruitkomsten die werden beschreven in de literatuur omvatten verbeteringen in patiëntgerichte zorg, samenwerkingsattitude en respect, wederzijdse kennis en begrip, gezamenlijke besluitvorming, communicatie, leiderschap, teamwork en reflexiviteit. In dit onderzoek identificeerden we verschillende beïnvloedende factoren, afkomstig vanuit de sociaal-culturele omgeving, de lerende en de leercontext. Factoren uit de sociaal-culturele omgeving omvatten het gezondheidszorgbeleid, het opleidingscurriculum en de fysieke en technologische infrastructuur. Factoren gerelateerd aan de lerende omvatten eerdere ervaring en kennis, motivatie en stuurkracht, ook wel agency genoemd. De leercontext omvat factoren die de blootstelling aan intraprofessionele samenwerking bepalen, het leerklimaat, beschikbare supervisie en begeleiding en de zwaarte en complexiteit van de zorgvraag. We sluiten het hoofdstuk af met een pleidooi voor het vergaren van meer robuust bewijs en een dieper begrip van onderliggende mechanismen. Ook doen we aanbevelingen om intraprofessioneel leren in de klinische praktijk te bevorderen.

Hoofdstuk 3 onderzoekt intraprofessioneel werkplekleren in de complexe omgeving van de derdelijns kindzorg in het Radboudumc Amalia kinderziekenhuis. In dit onderzoek brachten we leeractiviteiten en beïnvloedende factoren in kaart door middel van individuele en focusgroep interviews met aios en supervisoren. In de interviews beschreven aios en supervisoren veel verschillende leeractiviteiten in de dagelijkse zorg. Echter, gerichte aandacht voor intraprofessioneel leren ontbrak vaak in de klinische praktijk. We schetsen beïnvloedende factoren op systeem-, organisatie-, en persoonlijk en interpersoonlijk niveau. Onze bevindingen suggereren dat factoren op systeem- en organisatieniveau, zoals gezondheids- en opleidingsbeleid, de organisatie van het werk en de complexiteit van de zorg, voornamelijk bepalen of en hoe intraprofessionele leerkansen ontstaan. Factoren op persoonlijk en interpersoonlijk niveau, zoals de vermeende relevantie, het bewustzijn van leerkansen en de interpersoonlijke relaties, lijken

vooral te beïnvloeden of en hoe deze leerkansen benut worden. Samenvattend laat dit onderzoek zien dat, hoewel er veel kansen zijn om intraprofessioneel te leren in de complexe derdelijns zorg, leerkansen in de praktijk niet altijd (h)erkend en benut worden. We concluderen dat meer bewustzijn en gerichte aandacht nodig zijn om het intraprofessioneel werkplekleren van aios te ondersteunen. Op basis van de geïdentificeerde factoren doen we praktische aanbevelingen om intraprofessioneel werkplekleren van aios in complexe derdelijns zorg te verbeteren.

Hoewel deze studies ons waardevolle inzichten verschaffen, bieden ze onvoldoende begrip van de complexe onderliggende processen die een rol spelen in intraprofessioneel werkplekleren. **Hoofdstuk 4** beschrijft een studie waarin we met behulp van praktijkobservaties en diepte-interviews met aios de onderliggende processen ontrafelen. We beschrijven drie thema's die inzicht geven in de onderliggende processen: Het eerste thema betreft de stuurkracht (agency) van aios. Daarbij is het van belang dat aios leerkansen herkennen en deze willen, kunnen, mogen en durven benutten. Het tweede thema behandelt de dynamiek tussen medische specialismen. We observeerden dat professionals zichzelf en anderen indelen in 'ingroups' en 'outgroups', zich manifesterend in intraprofessionele stereotypen. Dit beïnvloedde het gevoel van verbondenheid en de bereidheid om samen te werken en te leren van aios. Het laatste thema beschrijft dat de communicatie over intraprofessionele samenwerking vaak uitsluitend taakgericht is. Dit leidt tot meningsverschillen die niet worden overbrugd of benut als leerkans en het leren van eenzijdige perspectieven. We concluderen dat, hoewel de dagelijkse zorgpraktijk talrijke mogelijkheden biedt voor intraprofessioneel leren, bewuste inspanningen nodig zijn om deze kansen beter te benutten ter verbetering van de samenwerking in de zorg. Tot slot pleiten we voor meer bewuste aandacht voor intraprofessioneel leren en het bevorderen van gedeelde verantwoordelijkheid, waarbij we de sleutelrol van de interactie tussen aios en supervisor benadrukken.

Deel II: Leren van een selectie assessment

Ons onderzoek naar de leerwaarde van het selectie assessment begint met een verkenning van de ervaren leerwaarde op het moment van de selectieprocedure. In **Hoofdstuk 5** onderzoeken we de ervaringen van sollicitanten voor de medische vervolgopleiding kindergeneeskunde. Door middel van interviews brachten we in kaart welke leerwaarde sollicitanten ervaren en welke factoren daarop van invloed zijn. In de interviews gaven sollicitanten aan dat ze het selectie assessment waardevol vinden voor het stimuleren van zelfreflectie en zelfbewustzijn. Het assessment kon leiden tot zelfacceptatie of tot het vormen

van nieuwe ontwikkeldoelen. Daarnaast gebruikten sollicitanten het assessment om hun geschiktheid voor het vak te beoordelen. Ook vonden sollicitanten het assessment nuttig om hun drijfveren beter naar voren te kunnen laten komen in hun werk. Ons onderzoek laat zien dat de ervaren leerwaarde werd beïnvloed door het vermogen van sollicitanten om resultaten te begrijpen en interpreteren, hun focus op het selectieaspect en hun ideeën over de aanvaardbaarheid en geloofwaardigheid van het assessment als selectie-instrument. We komen tot de conclusie dat, ondanks het leerpotentieel van het selectieassessment, het leren wordt overschaduwd door de focus van sollicitanten op het selectieaspect, waar aanzienlijke belangen aan verbonden zijn. We suggereren dat het leerpotentieel van het selectie assessment beter benut zou kunnen worden door het doelbewust te integreren in het opleidingscurriculum.

Ontwikkelingsgerichte coaching wordt steeds vaker ingezet als een middel om een positieve impuls te geven aan de professionele ontwikkeling van aios. Wij zagen hierin potentie als middel om het assessment beter te kunnen benutten als leerinstrument. In **Hoofdstuk 6** onderzoeken we een pilot interventie waarbij aios werden gecoacht met behulp van het selectie assessment. Door middel van individuele interviews met aios van verschillende specialismen en een focusgroep interview met coaches brachten we de waarde van het assessment voor ontwikkelingsgerichte coaching in de medische vervolgopleidingen in kaart. Ons onderzoek laat zien dat aios en coaches het assessment ervaarden als een ondersteunende tool, maar dat het niet leidend was in het coachproces. De ondersteunende rol lag in het bevorderen van de reflectie van aios en het versnellen van het coachingsproces. De ervaren waarde van het selectie assessment voor coaching werd beïnvloed door de attitude van aios en coaches. Reflecterend op onze bevindingen benadrukken we de relevantie in het huidige landschap van de medische vervolgopleidingen. De geïndividualiseerde toepassing van het selectie assessment in de coaching sluit aan op de bredere trend naar meer individualisering van de medische vervolgopleidingen. Bovendien zijn er vaak beperkte tijd en middelen beschikbaar voor coaching, waardoor een potentiële versnelling van het coachingsproces relevant is. Afsluitend benadrukken we dat het belangrijk is om het selectie assessment als leerinstrument te positioneren en handvatten te bieden voor de toepassing.

In **Hoofdstuk 7** sluiten we dit proefschrift af met een overzicht en reflectie op onze bevindingen. We beschouwen onze bevindingen over het intraprofessioneel werkplekleren door de lens van stuurkracht van de lerende (agency) en de mogelijkheden geboden door de werkplek (affordances). Reflecterend op onze

bevindingen schetsen we richtingen om het intraprofessioneel leerpotentieel van de werkplek beter uit de verf te laten komen, zoals het stimuleren van meer bewust intraprofessioneel leren en het creëren van een veilige intraprofessionele leeromgeving. Ook pleiten we voor meer aandacht voor teamidentiteit en gezamenlijke patiëntgerichte zorg. Vervolgens bespreken we onze bevindingen over het leerpotentieel van het selectie assessment. We schetsen dat het assessment het potentieel heeft om job crafting te ondersteunen, waarbij professionals hun werk bewust vormgeven om het beter aan te laten sluiten bij hun eigen behoeften en ambities. Ook kan het aios helpen om hun opleiding meer geïndividualiseerd vorm te geven. We stellen dat zonder bewuste aandacht het leerpotentieel van het selectie assessment echter onderbenut blijft, omdat het overschaduwd wordt door het selectieaspect. We suggereren dat het wellicht effectiever is om te investeren in het beter benutten van de leerwaarde van het assessment tijdens de vervolgopleiding, in plaats van te proberen het leren tijdens de selectieprocedure te bevorderen. We stellen strategieën voor om het leerpotentieel van het assessment beter te benutten, waaronder het explicieter presenteren als een leerinstrument, het stimuleren van leergedrag bij aios en het integreren in het opleidingscurriculum. Na het bespreken van methodologische overwegingen eindigen we met aanbevelingen voor de praktijk en mogelijke richtingen voor toekomstig onderzoek.

APPENDICES

List of abbreviations
Data management statement
Curriculum Vitae
PhD portfolio
Dankwoord | Acknowledgements

List of abbreviations

3-P	Presage – Process – Product (model by Tynjälä, 2013)
EA	Electronic Assessment
EPA	Entrustable Professional Activity
EPF	Electronic patient file
FAIR	Findable, Accessible, Interoperable, and Reusable (Guiding principles for scientific data management and stewardship, 2016)
IECPCP	Interprofessional Education for Collaborative Patient-Centred Practice (framework by D'Amour & Oandasan, 2005)
IPLC	Interprofessional Learning Continuum (model by Institute of Medicine, 2015)
MDM	Multidisciplinary meeting
NVMO	Nederlandse Vereniging Medisch Onderwijs
PGY	Postgraduate year
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SRQR	Standards for Reporting Qualitative Research

Data management statement

Ethics and privacy

The studies in this thesis were conducted in accordance with the principles of the Declaration of Helsinki. The Ethical Review Board of the Netherlands Association of Medical Education (in Dutch: Nederlandse Vereniging Medisch Onderwijs (NVMO)) has reviewed and approved the studies described in Chapter 4, 5 and 6. The Radboudumc Institutional Review Board has reviewed and approved the study described in Chapter 3, and the patient involvement in Chapter 4. For Chapter 2 (scoping review), no ethical approval was required as the dataset involved scientific publications.

The studies described in Chapter 3-6 involve human participants. Prior to their participation in these studies, participants were informed of their rights, the study's objectives, and how their data is protected. Participant data were treated confidentially and pseudonymized or anonymized prior to analyses. Participation in these studies was voluntary, and written consent was obtained from all participants.

Data collection and storage

Original data was collected for the studies described in Chapter 3-6. Interviews (Chapter 3-6) were recorded using a voice recorder and transcribed verbatim by tekstuitschrijven.nl, a professional transcription company bound by a confidentiality agreement with Radboudumc. Observations (Chapter 4) were captured in detailed field notes. Data storage was guided by the Findable, Accessible, Interoperable, and Reusable (FAIR) principles.

Most data are digitally stored at the secured and protected O-station of the Pediatrics Department of the Radboudumc Amalia Children's Hospital. Identifiable data are stored separately from research data to ensure that the data cannot be directly linked to each other. Whenever feasible, paper data have been digitized and stored electronically. Remaining paper data, including informed consent forms of participants (Chapter 3-6) and original field notes (Chapter 4), are securely stored in the locked archive of the Pediatrics Department.

Unless specified differently in the study protocol, data will be stored for 10 years after termination of the study, in accordance with the Dutch Code of Conduct for Scientific Practice. Identifiable data will be retained for a duration of 5 years for participants who have provided consent to be contacted for potential future follow-up research, and for a duration of 1 year for those who have not.

Availability of data

The studies of this thesis were or will be published open access. The dataset generated for Chapter 2 is publicly available in the DANS EASY repository (doi: 10.17026/dans-zb5-2hfg). Data were made reusable by providing relevant metadata. Data from the other studies (Chapter 3-6) are not publicly available due to privacy and/or ethical restrictions. The data analyzed in these studies are available from the corresponding author upon reasonable request.

Curriculum Vitae

Lara Teheux werd geboren op 7 oktober 1992 te Ede. Ze groeide op in Malden. In 2011 behaalde ze cum laude haar tweetalig Gymnasium diploma aan het Kandinsky College te Nijmegen, waarna ze in datzelfde jaar begon met haar studie Geneeskunde aan de Radboud Universiteit te Nijmegen. Gedurende haar studiejaren deed Lara verschillende bestuursjaren bij de studentenorganisaties the International Federation of Medical Students' Associations – the Netherlands (IFMSA-NL) en the European Medical Students' Association (EMSA) en als studentvertegenwoordiger binnen the Association for Medical Education in Europe (AMEE). Daarnaast zette zij zich in als trainer en coach voor IFMSA-NL en de Landelijke Studentenvakbond (LSVb).

In 2018 behaalde Lara haar artsexamen, waarna ze als arts-assistent aan de slag ging op de afdeling kindergeneeskunde in het Canisius Wilhelmina Ziekenhuis in Nijmegen. Naast haar klinische werkzaamheden coördineerde ze het onderwijs voor arts-assistenten.

Eind 2019 begon Lara met haar promotieonderzoek op het vlak van de medische vervolgopleidingen in het Radboudumc Amalia kinderziekenhuis te Nijmegen. Gedurende de eerste twee jaar combineerde Lara dit met een deeltijdaanstelling als Arts Klinisch Onderwijs. Hierbij gaf ze onderwijs aan studenten geneeskunde en biomedische wetenschappen en was ze betrokken bij de innovatie van het onderwijs.

Naast haar promotieonderzoek was Lara actief lid van de Radboud Institute for Health Sciences (RIHS) PhD council en de Training and Supervision Plan beoordelingscommissie. Daarnaast fungeerde ze als coördinator van het onderwijs voor wetenschapsstudenten binnen de kindergeneeskunde en als lid van de Amalia Excellent Student Program commissie. Lara zette zich ook in voor (inter)nationale PhD kandidaten binnen de gezondheidszorgopleidingen als bestuurslid van het Jonge Onderzoekers Netwerk van de Nederlandse Vereniging Medisch Onderwijs (NVMO JON) en als early career researcher representative binnen the Association for Medical Education in Europe (AMEE). Ook speelde ze een ondersteunende rol bij een aantal andere onderzoeks- en innovatieprojecten binnen de medische vervolgopleidingen.

In juli 2024 zal Lara starten met de medische vervolgopleiding tot kinderarts in de Onderwijs- en Opleidingsregio Oost-Nederland (OOR ON) in het Rijnstate ziekenhuis te Arnhem en het Radboudumc Amalia kinderziekenhuis te Nijmegen. Parallel aan haar opleiding zal ze haar onderzoeksactiviteiten voortzetten als postdoctoraal onderzoeker binnen het Radboudumc Amalia kinderziekenhuis.

PhD portfolio

Department: **Pediatrics**
PhD period: **01/12/2019 – 30/11/2023**
PhD Supervisor(s): **Prof. Dr. A.A.E.M. van der Velden, Prof. Dr. M.A.A.P. Willemsen**
PhD Co-supervisor(s): **Dr. W. Kuijer-Siebelink, Dr. E.H.A.J. Coolen**

Training activities	Hours
Courses	
• Radboudumc - Introduction day (2020)	6.00
• RIHS - Introduction course for PhD candidates (2020)	15.00
• Radboudumc - Literature review for your PhD: how to search and where to publish (2020)	8.00
• RU - Qualitative research methods and analysis (2020)	84.00
• RU - Scientific writing for PhD candidates (2020)	84.00
• RU - Writing a review article (2020)	28.00
• Radboudumc - How to sell your science (2020)	6.00
• Evers Research - Participant observation (2021)	28.00
• RU - The art of presenting science (2021)	36.00
• Radboudumc - Scientific integrity (2021)	20.00
• Radboudumc - eBROK course (2021)	42.00
• RU - Achieving your goals and performing more successfully in your PhD (2022)	28.00
• Radboudumc - University Teaching Qualification (BKO) (2022)	84.00
• Evers Research - Advanced qualitative analysis (2023)	16.00
• Radboudumc - Career development course: The next step in my career (2023)	20.00
• RU - Analytic storytelling (2023)	20.00
• Nina Jilesen - Private presentation course (2023)	5.00
Seminars	
• NVK Concilium Paediatricum symposium on resident selection (including oral presentation) (2020)	10.00
• TULIPS Young Researchers Day (2020)	5.00
• PON - Workshop the art of presenting science (2020)	2.00
• Oral presentation at Amalia Research Meeting (2020)	8.00
• RIHS PhD council - Workshop writing a peer review (2021)	2.00

• NVMO JON - Workshop writing a conference abstract (2021)	2.00
• RIHS PhD council - Workshop writing a rebuttal (2021)	2.00
• NVMO JON - Workshop creating research impact (2021)	2.00
• NVMO JON - Workshop scientific misconduct (2021)	2.00
• TULIPS Young Researchers Day Speedsession Social Media & Science (2021)	2.00
• Radboudumc Amalia Children's Hospital Science Day (including chairing part of the day) (2021)	10.00
• RIHS PhD council - Workshop new year's resolutions (2022)	1.00
• NVMO JON - Workshop: dealing with peer review and rejection (2022)	1.00
• RIHS PhD council - Workshop negogiation skills (2022)	1.00
• RIHS PhD council - Workshop prepare your defence (2022)	2.00
• NVMO JON - Workshop embracing interdisciplinarity and transdisciplinarity (2023)	1.00
• OOR-ON Opleidingsmiddag (2023)	5.00
• Oral presentation at Amalia Research Meeting (2023)	8.00
• Radboudumc Research Integrity Round March (2023)	1.50
• Radboudumc Research Integrity Round September (2023)	2.50
• Radboudumc Amalia Children's Hospital Science Day (2023)	8.00
• Radboudumc Amalia Children's Hospital Research Meetings (2019 - 2023)	50.00
• RHA Research Community Medical Education meetings (2019 - 2023)	40.00
• Pediatrics PhD - Internal Knowledge Exchange (2022 - 2023)	16.00
Conferences	
• AMEE Conference (including e-poster presentation and session commentary) (2020)	42.00
• NVMO Congres + preconference workshop (including oral presentation) (2020)	25.00
• MMV Congres (2020)	8.00
• NVK Congres (including oral presentation) (2020)	15.00
• NVMO PhD day + preconference workshop (including oral presentation) (2021)	20.00
• IAMSE Conference (2021)	32.00
• AMEE Conference + preconference workshop (including oral presentation and hosting networking session) (2021)	34.00
• NVK Congres (including oral presentation) (2021)	15.00
• MMV Congres (2021)	8.00

• NVMO PhD day + preconference workshop (including oral presentation) (2022)	20.00
• RIHS PhD retreat (including helping with organization of event and including presentation) (2022)	23.00
• NVK Congres (including symposium presentation) (2022)	15.00
• NVMO Congres (including oral presentation and workshop presentation) (2022)	32.00
• AMEE Conference (including oral presentation, workshop and preconference workshop presentation) (2022)	53.00
• ICRE Conference (including two oral presentations) (2022)	38.00
• RIHS PhD retreat (2022)	8.00
• EAPRIL Conference (2022)	24.00
• MMV Congres (including workshop presentation) (2022)	15.00
• NVMO PhD Day preconference workshop (2023)	3.00
• NVMO Congres (including two oral presentations, preconference workshop organizing and presentation and symposium presentation) (2023)	48.00
• IAMSE Conference (including oral presentation) (2023)	31.00
• AMEE Conference (including oral presentation and preconference workshop presentation) (2023)	39.00
• MMV Congres (including workshop presentation) (2023)	15.00
Other	
• Peer reviews for scientific journals (2019 - 2023)	32.00
• Peer review (intervisie) group (2020 - 2023)	20.00
• Amalia Excellent Student Programme Committee, including organizing masterclasses and symposia (2020 - 2023)	60.00
• RIHS PhD council member education + PhD representative in RIHS TSP committee (2020 - 2022)	90.00
• NVMO Young Researchers Network (JON) Board Member (2021 - 2023)	20.00
• AMEE Conference Planning Committee - early career researcher representative (2021 - 2022)	20.00
• Pediatrics PhD coordinator (2021 - 2022)	20.00
• Organizing the Pediatrics PhD writing retreat (2022)	12.00
• Innovation Fund Postgraduate Medical Training Committee (2022 - 2023)	12.00

Teaching activities	
Lecturing	
• Teacher in pediatrics (Arts Klinisch Onderwijs), 0.5 fte contract (2019-2021)	
Supervision of internships / other	
• Supervision of student research intern (2020)	30.00
• Supervision of student research intern (2021)	30.00
• Delivering workshop at RIHS Introduction Course (2022)	4.00
• Supervision sociology bachelor student research project (2022-2023)	30.00
• Mentoring of student research interns (2020-2023)	21.00
Total	**1,678.00**

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