



## From Theory to Practice: A Qualitative Exploration of House Officers' Clinical Learning Experience in Prosthodontics

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### ABSTRACT

**Objective:** This study aimed to explore the lived experiences of Prosthodontics House Officers (HOs) in translating theoretical knowledge into clinical practice during their rotations, addressing the persistent theory-practice gap in dental education.

**Methods:** A qualitative phenomenological approach, guided by hermeneutic phenomenology and the Knowledge-to-Action (KTA) framework, was employed to examine how newly graduated dental trainees experienced and directed the transition from theory to practice. Purposeful sampling was used to recruit twenty Prosthodontics HOs who had completed their clinical rotations at a private dental college in Lahore, Pakistan. Data were collected through in-depth, semi-structured, face-to-face interviews. Interviews were audio-recorded, transcribed verbatim, and analyzed using Braun and Clarke's six-phase thematic analysis approach with the support of NVivo 14 software. Trustworthiness was ensured through the application of credibility, transferability, dependability, and confirmability criteria, including peer debriefing, member checking, and multiple coder verification.

**Results:** Three major themes emerged: (1) Evolving Clinical Confidence Through Situated Knowledge Application, highlighting the gradual development of competence and professional responsibility through hands-on patient care; (2) Inhibitors to Knowledge Translation in Early Clinical Encounters, identifying challenges such as insufficient knowledge recall, failure to apply theoretical concepts, limited experience, and procedural haste; and (3) Catalysts for Clinical Skill Consolidation and Reflective Growth, emphasizing the role of facilitator support, critical thinking, reflective learning, early clinical exposure, and laboratory practice in bridging the theory-practice gap.

**Conclusion:** While theoretical preparation provides a foundation, effective clinical competence in prosthodontics evolves through supervised practice, mentorship, critical reflection, and progressive patient exposure. Addressing the theory-practice gap requires intentional educational strategies that blend knowledge, skill development, and guided real-world experiences to ensure safe, confident, and effective patient care.

**Keywords:** Knowledge translation; Theory-practice gap; Prosthodontics; Dentistry; House officer; Clinical facilitator

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## Introduction

Clinical competence in dentistry requires the effective integration of theoretical knowledge with practical skills to ensure optimal patient care.<sup>1</sup> Dental education programs worldwide are structured to provide students with a comprehensive foundation in biomedical sciences, alongside supervised clinical experiences designed to foster the development of psychomotor and clinical reasoning skills. This dual focus prepares students not only to acquire knowledge but also to apply it meaningfully in patient care.<sup>2</sup> However, despite these carefully designed curricula, the transition from classroom-based learning to real-world clinical practice remains a significant challenge for many dental students and recent graduates. The difficulties encountered in applying academic knowledge to clinical scenarios are collectively described as the theory-practice gap.

The theory-practice gap is a well-recognized phenomenon in healthcare education, including medicine, nursing, and dentistry. It highlights the discrepancies between what is taught in academic settings and what is required in actual patient care.<sup>3</sup> In prosthodontics, an intricate branch of dentistry focused on the restoration and replacement of teeth, the consequences of this gap can be particularly pronounced.<sup>4</sup> Failure to effectively bridge the gap may not only compromise patient safety and outcomes. Still, it may also erode student confidence, increase procedural errors, prolong treatment durations, and diminish overall healthcare delivery quality. For new graduates, these challenges can contribute to feelings of inadequacy, anxiety, and self-doubt, especially when they are expected to independently manage complex clinical cases shortly after completing their academic studies.<sup>3</sup>

Several interconnected factors contribute to the persistence of the theory-practice gap in dental education. Firstly, the limitations of simulated educational environments may not fully capture the unpredictability and complexity of real-life patient care.<sup>1</sup> Classroom lectures, laboratory exercises, and even high-fidelity simulations often simplify clinical situations, making the transition to actual clinical practice more daunting. Secondly, limited

clinical exposure during undergraduate training may restrict students' opportunities to encounter a wide variety of patient cases, thereby limiting their experiential learning and reducing their ability to adapt theoretical concepts to novel clinical scenarios.<sup>4</sup> Thirdly, evolving clinical technologies and techniques often outpace curricular revisions, leaving graduates unfamiliar with the latest advances by the time they enter independent practice. Inadequate mentorship and variability in clinical supervision further exacerbate these challenges, depriving students of the timely guidance, feedback, and role modeling necessary to build competence and confidence.<sup>5</sup>

In addition to these structural issues, emotional and psychological factors also play a significant role in perpetuating the theory-practice gap.<sup>6</sup> The transition from student to practitioner places new graduates in high-stakes environments where patient care decisions carry real consequences. The fear of making errors, combined with limited experience, can lead to hesitation, anxiety, and reduced clinical performance. Novice practitioners may struggle with clinical decision-making, communication with patients, or adjusting to unexpected procedural complications, all of which can amplify the difficulty of translating academic knowledge into effective clinical interventions.<sup>7</sup> These psychological burdens not only impede technical performance but also affect professional identity formation, motivation, and long-term career satisfaction.

Prosthodontics presents unique challenges within dental education due to its demand for high-level technical precision, procedural accuracy, artistic craftsmanship, and complex interdisciplinary knowledge.<sup>8</sup> The restoration of oral function and esthetics often requires meticulous planning, precise execution of procedures, and seamless integration of theoretical knowledge with psychomotor dexterity. Success in prosthodontics thus requires a delicate balance of knowledge, skill, critical thinking, and adaptability. Graduates must master not only the scientific principles behind prosthodontic procedures but also the manual skills necessary for their precise execution. Moreover, successful outcomes depend on effective communication with patients,



collaboration with laboratory technicians, and adaptability in the face of clinical challenges.

In many dental institutions, newly graduated students are assigned a three-month rotation in the Department of Prosthodontics during their house officer training period. This phase represents a pivotal point in their professional development, providing them with the opportunity to apply theoretical knowledge in actual patient care under supervision. During this period, they interact with patients from diverse linguistic, cultural, and socioeconomic backgrounds, which further enriches their learning experiences. This exposure not only enhances their technical abilities but also cultivates essential non-technical skills such as cultural competence, empathy, and effective patient communication. Engaging with diverse patient populations challenges house officers to adapt their clinical approaches, consider individual patient needs, and develop personalized treatment plans. Through this process, house officers gradually build confidence, professional maturity, and autonomy, all of which are critical for successful independent practice.<sup>8</sup>

Despite these valuable opportunities, observations indicate that many prosthodontic house officers still encounter significant difficulties at the start of their clinical rotations. They may struggle to recall foundational biomedical sciences or apply theoretical concepts effectively in real-time clinical settings. Challenges frequently arise in areas such as diagnosis, treatment planning, procedural sequencing, and management of unforeseen complications.<sup>9</sup> These difficulties highlight the ongoing relevance of the theory-practice gap and underscore the need for targeted educational interventions that directly address the unique challenges faced during this critical transitional phase.

The rationale for this study stems from the limited qualitative research available that specifically explores how newly graduated dental house officers experience and navigate the theory-practice gap within prosthodontics. While numerous studies have examined knowledge translation challenges in medical and nursing education, there remains a paucity of focused investigation into the lived experiences of dental trainees undergoing prosthodontic rotations. Understanding these experiences is vital for

identifying specific barriers, refining educational strategies, and optimizing training programs to better prepare future dental practitioners for clinical realities. Insights gleaned from such research may inform curriculum development, enhance mentorship structures, strengthen clinical supervision, and introduce innovative teaching approaches such as simulation-based training or early clinical exposure.

Therefore, this study aims to explore the lived experiences of Prosthodontics House Officers (HOs) as they transition from theory to practice. By examining their challenges, perceptions, and adaptive strategies, this research seeks to shed light on the factors influencing their ability to effectively translate theoretical knowledge into clinical competence.

## Materials and Methods

### Study Design and Philosophical Orientation

This qualitative study was conducted in the Department of Prosthodontics at a private dental teaching institution in Lahore, Pakistan. The research employed a hermeneutic phenomenological approach to explore the lived experiences of dental house officers (HOs) during their prosthodontics clinical rotation. Hermeneutic phenomenology, with its emphasis on interpretation within context, was selected for its capacity to uncover how novice practitioners perceive and make meaning of their transition from theoretical instruction to clinical execution.

To further enhance conceptual grounding, the study was informed by the Knowledge-to-Action (KTA) Framework, which conceptualizes knowledge translation as a dynamic, iterative process influenced by individual, contextual, and systemic variables.<sup>5</sup> The integration of KTA allowed the researchers to examine not only participants' subjective experiences but also the broader educational structures shaping their clinical readiness.

### Ethical Considerations

The study received ethical approval from the institutional review board (IRB# 0116-23). Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were maintained by de-identifying



transcripts and securely storing data. Participants were assured that their responses would not affect their academic standing or evaluation in any form.

### Participant Selection

A purposive sampling strategy was employed to recruit information-rich participants who had completed their three-month rotation in the Department of Prosthodontics. Eligibility criteria included successful completion of the clinical rotation and willingness to provide informed consent. Dental house officers who had not completed the rotation or who declined to participate were excluded from the study. While 20 participants initially consented, data collection concluded at the 15th interview upon achieving data saturation, operationally defined as the point at which no new codes or insights emerged during subsequent interviews.

### Data Collection Procedures

Data were collected through in-depth, semi-structured interviews conducted in a private room within the institution to facilitate open dialogue. The interview guide was developed following a comprehensive literature review on the theory-practice gap and knowledge translation in health professions education. Sources were drawn from databases including PubMed, Scopus, and Google Scholar. The guide was piloted with three house officers to refine question clarity and eliminate redundancies. Minor adjustments were made following the pilot phase. Each interview lasted approximately 30 to 45 minutes and was audio-recorded with participant consent. Open-ended questions encouraged participants to share experiences freely, while probing questions allowed for deeper exploration of emerging themes. Field notes were taken concurrently to capture contextual information and non-verbal cues, enriching the dataset.

### Data Analysis

All interviews were transcribed verbatim and cross-checked for accuracy and completeness. Data were analyzed using Braun and Clarke's six-phase framework for thematic analysis: familiarization with data, generation of initial codes, theme identification, theme review, theme definition, and report production.<sup>10</sup> NVivo 14 software was used to facilitate data management, coding, and visual representation of word

frequencies.

Coding was performed independently by multiple researchers with backgrounds in clinical dentistry and medical education. Collaborative sessions followed to develop a consensus-based coding framework. This iterative process allowed for refinement of emerging themes and ensured consistency across the analytic stages.

### Trustworthiness and Rigor

To ensure methodological rigor, the study adhered to Lincoln and Guba's four criteria for trustworthiness.<sup>11</sup> Credibility was established through prolonged engagement, triangulation of analysts, peer debriefings, and member checking with select participants. Transferability was supported by providing rich descriptions of the research context, participant demographics, and data collection process. Dependability was ensured through an audit trail documenting methodological decisions, while confirmability was enhanced by reflexive journaling and independent verification of codes and themes by multiple researchers.

The research team actively engaged in reflexivity, acknowledging how their disciplinary backgrounds could influence data interpretation. A medical educationist was present during both the interview and transcription phases to further mitigate researcher bias and enhance analytical neutrality.

### Quality Markers

All methodological choices, including theoretical framing, data collection, and analytic strategies, were informed by best practices in global qualitative research within health professions education. The study design supports contextual transferability and contributes to the international discourse on bridging the theory-practice gap in dental education.

### Results

Thematic analysis of the interview data was conducted following Braun and Clarke's (2006) six-phase approach using NVivo 14 software. The analysis was informed by the hermeneutic phenomenological framework and the Knowledge-to-Action (KTA) model, which guided the researchers to explore participants' lived experiences of translating theoretical knowledge



into clinical practice within prosthodontics.

The initial coding process was conducted independently by three members of the research team, who possess expertise in dental education, qualitative research, and medical education. Consensus meetings were held regularly to review and refine the coding framework. Peer debriefing sessions were conducted with additional medical educationists and prosthodontic faculty members to verify the relevance and accuracy of emerging themes. To ensure credibility, selected participants were involved in member checking to confirm that the identified themes accurately reflected their experiences.

The analysis revealed three major themes and corresponding subthemes, capturing the Prosthodontics House Officers' (HOs) experiences, challenges, and strategies related to the theory-practice gap: Thematic analysis of the interview data was conducted following Braun and Clarke's (2006) six-phase approach using NVivo 14 software. The analysis was informed by the hermeneutic phenomenological framework and the Knowledge-to-Action (KTA) model, which guided the researchers to explore participants' lived experiences of translating theoretical knowledge into clinical practice within prosthodontics. Such as Lack of Knowledge Prevents Procedure Completion (*sub-theme*) and *"We have studied that before taking an impression, mouth preparation should be done, but while doing the procedure, we didn't implement the theory, which resulted in failure."* (*participant's response*)

The initial coding process was conducted independently by three members of the research team, who possess expertise in dental education, qualitative research, and medical education. Consensus meetings were held regularly to review and refine the coding framework. Peer debriefing sessions were conducted with additional medical educationists and prosthodontic faculty members to verify the accuracy and relevance of the emerging themes. To ensure credibility, selected participants were also involved in member checking to confirm that the identified themes authentically represented their experiences.

The analysis generated three overarching themes with corresponding subthemes, capturing the experiences, perceived challenges, and suggested strategies of Prosthodontics House Officers (HOs) during their transition from theoretical knowledge to clinical practice (Table 1).

### **Theme 1: Evolving Clinical Confidence Through Situated Knowledge Application**

Participants described a transformative journey from academic learning to confident clinical practice. Initially undefined, through the practical application of theoretical knowledge, the participants gradually developed competence. A consistent insight was that clinical success depends on a strong theoretical foundation; without it, participants struggled to achieve desired outcomes. They stated a clear shift from dependence to independence, gaining confidence in performing prosthodontic procedures independently from the start to the end of rotation. The clinical rotation environment was considered an important phase in learning, allowing the participants to refine skills through repeated practice and feedback, free from the pressures of academic assessments. This hands-on practice also developed a sense of professional responsibility among the participants.

This theme emphasizes that clinical competence emerges not from knowledge acquisition alone, but from the embodied experience of applying that knowledge in authentic, high-stakes contexts, transforming passive understanding into confident, context-responsive practice.

### **Theme 2: Inhibitors to Knowledge Translation in Early Clinical Encounters**

Participants, particularly in the early phase of their rotations, encountered several barriers that hindered the effective application of theoretical knowledge to clinical performance. Even when foundational knowledge was present, many struggled to bridge the gap between knowledge and practice, highlighting a gap between cognitive learning and clinical application. Additionally, rushing through procedures and a lack of patience frequently resulted in errors, exploring the importance of mindfulness and thoughtful practice in clinical competence. Some participants acknowledged that a non-serious attitude and failure to follow the clinical procedural protocols contributed to mistakes, and limited prior exposure to hands-on training further exaggerated the initial difficulties, highlighting the need for more structured pre-clinical preparation.

This theme highlights how behavioral, cognitive, and structural barriers intersect to disrupt the seamless application of theory in practice, underscoring the importance of deliberate, guided transitions from didactic learning to independent clinical action.

**Theme 3: Catalysts for Clinical Skill Consolidation and Reflective Growth**

Participants acknowledged several strategies that foster the transition from procedural uncertainty to clinical mastery. A recurring insight was the importance of deliberate and accurate application of theoretical knowledge; precision at each procedural step was seen as foundational to achieving consistent clinical success.

Active engagement with clinical facilitators, seeking timely guidance, helping clarify misconceptions, improving clinical skills, and promoting reflective learning. Similarly, learning from mistakes was viewed as a powerful growing process; participants highlighted that reflection on mistakes contributed to progressive

skill improvement and greater self-awareness. Developing critical thinking was also observed as essential for problem-solving during clinical challenges. Furthermore, early and increased clinical exposure, complemented by laboratory practice, was also considered important in bridging the gap between theoretical knowledge and clinical practice. Such experiences not only strengthened psychomotor skills but also built confidence in real patient care settings.

This theme demonstrates that competence in prosthodontics is cultivated through a dynamic interplay of deliberate practice, reflective inquiry, mentorship, and experiential exposure, each of which contributes to meaningful and sustainable knowledge translation.

**Table 1: Summary of Emergent Themes, Subthemes, and Illustrative Participant Quotations Reflecting the Theory-to-Practice Transition in Prosthodontic Training**

THEME	SUB-THEME	RESPONSES
Theme 1: Evolving Clinical Confidence Through Situated Knowledge Application	Knowledge into Clinical Practice Provides Results	<i>"I have seen that if we are doing work without any basic knowledge, then we do not get the expected results."</i>
	Competency at the End of Rotation:	<i>"By the end of my Prosthodontics house job rotation, I can practice and perform certain procedures independently."</i>
	Prosthodontics Rotation as a Time of Great Learning:	<i>"I learned a lot because I had many opportunities to practice and improve my skills, without the burden of studies."</i>
	Developing a Sense of Responsibility:	<i>"Being a Prosthodontic HO, you should consider it a valuable learning opportunity and take responsibility for your procedures."</i>
Theme 2: Inhibitors to Knowledge Translation in Early Clinical Encounters	Lack of Knowledge Prevents Procedure Completion	<i>"We have studied that before taking an impression, mouth preparation should be done, but while doing the procedure, we didn't implement the theory, which resulted in failure."</i>
	Failure to Apply Knowledge	<i>"The knowledge was not applied to clinical procedure and resulted in the faulty denture."</i>
	Rushing Through Procedures	<i>"If you hurry in any procedure, you cannot get the results you want."</i>
	Non-Serious Attitude	<i>"In my failure, my own role came first — I did not follow instructions very well, but learned for the future."</i>
	Limited Clinical Experience	<i>"It was my first experience, and I had little knowledge about how to perform the procedure."</i>



Theme 3: Catalysts for Clinical Skill Consolidation and Reflective Growth	Thorough Application of Knowledge	<i>"We have studied that before taking an impression, mouth preparation should be done, but while doing the procedure, we didn't implement the theory, which resulted in failure."</i>
	Seeking Guidance from Clinical Facilitators	<i>"You can further refine your clinical abilities by posing inquiries to the facilitators."</i>
	Learning from Mistakes	<i>"With experience, I learned from my mistakes. After a few mistakes, I tried to avoid them in future patients."</i>
	Critical Thinking	<i>"In clinical settings, you must think from every angle when doing any procedure."</i>
	Early and Increased Clinical Exposure	<i>"I think more clinical exposure, more patient exposure, and more lab work will help in learning."</i>
	Laboratory Practice	<i>"Doing lab procedures has an impact on real clinical procedures."</i>

## Discussion

This study offers timely and in-depth insight into the lived experiences of Prosthodontics House Officers (HOs) as they navigated the challenging process of translating theoretical knowledge into clinical competence. By applying a hermeneutic phenomenological lens supported by the Knowledge-to-Action (KTA) framework, this study advances the understanding of the theory-practice gap within prosthodontic education, a gap often acknowledged but seldom explored from the perspective of newly graduated practitioners in real-world settings. While much has been written about similar challenges in nursing and medical education, this research contributes novel findings specific to the nuanced demands of prosthodontics, where clinical excellence requires a fusion of scientific precision, aesthetic judgment, and psychomotor skill.

Unlike previous studies that predominantly address broader dental education or rely on quantitative data, this work foregrounds the voices of house officers in the critical transitional phase of early clinical practice. The identified themes, clinical confidence development, barriers to successful performance, and competence-facilitating strategies, resonate with existing literature but also introduce distinctive contextual and experiential dimensions. For example, while the cognitive difficulty of knowledge application is a well-documented issue across health professions,

the participants in this study articulated how procedural failures and initial uncertainty were compounded by behavioral and attitudinal factors such as overconfidence, hasty execution, or lack of seriousness, elements that are often underemphasized in prior research.<sup>12</sup>

Previous research exploring the theory-practice gap in dental and health professions education has largely centered on either broad educational frameworks or specific technical competencies, with relatively limited focus on the holistic transition experiences of new dental graduates. For instance, a study by Javed et al., examined final-year dental students' preparedness for clinical practice across multiple specialties in Pakistan and found significant disparities between theoretical instruction and clinical readiness, particularly in complex disciplines like prosthodontics.<sup>13</sup> Similarly, another study used survey methods to assess knowledge retention among dental interns and reported substantial attrition of basic science knowledge during the clinical training year, often attributed to rote learning methods and limited real-life application.<sup>14</sup> Internationally, studies in the UK highlighted dental students' concerns over insufficient preclinical training, which they believed hindered confidence and procedural safety during initial patient interactions.<sup>15</sup> In South Asian contexts, research from India and Bangladesh has echoed similar concerns, reporting inadequate simulation-based practice led to hesitation and overdependence



on faculty during clinical procedures, while others noted that dental house surgeons often lacked confidence in prosthodontic planning and struggled with independent decision-making.<sup>16, 17</sup> These studies collectively underscore a recurring pattern across diverse settings, the persistent difficulty of translating didactic learning into clinical proficiency, yet few have explored these challenges through an interpretive, phenomenological lens that captures the nuanced emotional, cognitive, and institutional dynamics at play during this critical transition.

Importantly, this study situates these challenges within the particular realities of dental education in Pakistan. As in many low- and middle-income countries, undergraduate dental training in Pakistan often struggles with insufficient preclinical exposure, limited faculty-to-student ratios, and outdated curricula that are slow to adapt to emerging clinical technologies.<sup>18</sup> These systemic gaps are likely contributors to the theory-practice disconnect described by the participants. Furthermore, the cultural expectation of rapid competence in early house job rotations adds psychological pressure that may inhibit reflective learning and self-regulation. The participants' emphasis on experiential learning, facilitated mentorship, and the emotional toll of clinical responsibility underscores the need for more robust transition support in postgraduate dental training.

When viewed in a regional context, the Pakistani dental education landscape shares several structural similarities with neighboring South Asian countries such as India, Bangladesh, and Sri Lanka, including high student volumes, reliance on traditional didactic teaching methods, and a general lack of simulation-based infrastructure. However, there are important differences as well. In India and China, for instance, increased investment in simulation labs and digital learning tools has begun to close the preclinical-clinical divide.<sup>19</sup> Conversely, in Afghanistan and some parts of Bangladesh, ongoing political or resource instability may further hinder hands-on clinical preparedness.<sup>20</sup> Notably, the study was conducted in Lahore, a city that houses the largest number of dental schools in Pakistan. This urban concentration of educational institutions draws a diverse cohort of house officers and provides a reasonably representative snapshot of broader national practices, increasing the transferability of findings to other institutional contexts within the country.

This study's strength lies in its methodological rigor and depth of participant engagement. The combination of hermeneutic phenomenology and the KTA framework offered a dual lens for understanding both the lived experiences of trainees and the systemic dynamics of knowledge translation. Trustworthiness was maintained through peer debriefing, independent coding, and participant member checking. The longitudinal, real-time reflections of house officers add authenticity and richness that are often missing in retrospective or survey-based designs.

Nevertheless, some limitations must be acknowledged. The data were drawn from a single institution, and while the diversity of participants enhances generalizability within urban Pakistan, perspectives from rural or public-sector institutions may differ. Additionally, as with all self-reported data, social desirability bias cannot be entirely ruled out. The absence of faculty or supervisor perspectives also limits a more holistic understanding of the educational ecosystem.

Looking ahead, future studies could build upon these findings by incorporating faculty viewpoints, assessing the impact of curricular redesigns aimed at earlier clinical immersion, or evaluating mentorship interventions. Multi-site or cross-country comparative studies across South Asia would further contextualize how institutional, cultural, and policy differences shape the theory-practice gap in dental education. Longitudinal qualitative studies could also help map how house officers' clinical identities evolve, offering insights into sustaining competence beyond initial rotations.

## Conclusion

This qualitative study identified key factors influencing the translation of theoretical knowledge into clinical competence among prosthodontic house officers. Findings revealed that limited clinical exposure, insufficient application of foundational knowledge, and lack of structured mentorship contribute to the persistence of the theory-practice gap. Conversely, facilitators such as guided supervision, critical thinking, and increased patient contact were associated with improved clinical confidence and skill acquisition. These results underscore the need for targeted educational reforms in early postgraduate dental training, particularly in contexts with constrained resources. Incorporating structured experiential learning and faculty-guided reflection may enhance the



effectiveness of clinical transitions in prosthodontics and related disciplines.

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## Author Contribution

SS conceived and designed the study, collected and transcribed the data, and drafted the manuscript. Data analysis and interpretation were carried out by SS, SA, and FH. SA and FH critically revised the manuscript for important intellectual content. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

## Data Availability Statement

All relevant data are within the manuscript. Additional data supporting this study are available from the corresponding author upon reasonable request.

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## Conflict of Interest

The author has no conflicts of interest to disclose and is solely responsible for the content and writing of this article. This article is part of the MHPE thesis.

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