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UNVEILING PLACEBO POTENTIAL: A PUBLIC HEALTH APPROACH TO UNDERSTANDING AND HARNESSING LOW BACK PAIN RESPONSES IN ISRAEL

DISSERTATION SUMMARY

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LIST OF ABBREVIATIONS

APE	Analgesic Placebo Effect
APRT	Accurate-Pain-Reporting Training
BPS	Biopsychosocial (model)
CBT	Cognitive Behavioral Therapy
FAST	Focused Analgesia Selection Test
HMO	Health Maintenance Organization
IASP	International Association for the Study of Pain
LBP	Low Back Pain
MBSR	Mindfulness-Based Stress Reduction
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OLP	Open-Label Placebo
PCC	Patient-Centered Care
PE	Placebo Effect
RCT	Randomized Controlled Trial
SDM	Shared Decision-Making
SSRIs	Selective Serotonin Reuptake Inhibitors
VoPR	Verbal Placebo Response

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INTRODUCTION

1.1. Background

Over the past five decades, pain has been the subject of extensive inquiry by scholars and medical institutions. Contemporary accounts characterize pain as a multidimensional phenomenon that encompasses sensory, physiological, and contextual components and that functions as a protective signal by alerting the organism to actual or potential injury (IASP; Raja et al., 2021; Trouvin & Perrot, 2019). Importantly, pain is inherently subjective—its quality and intensity vary markedly across people—posing persistent challenges for valid measurement and effective clinical interventions and management (Cao et al., 2024). As such, direct assessment relies primarily on self-report instruments, supplemented—albeit less consistently—by behavioral and observational indicators that can contextualize patients' subjective experiences (Fillingim, 2017).

Within this broader framework of pain, low back pain (LBP) has emerged as a distinct and pressing clinical and public health concern (Lieven et al., 2025). LBP is commonly defined as persistent pain located between the lower six ribs and the inferior aspect of the buttocks, with or without radiation to the lower limbs (Maher & Ferreira, 2022). It is globally recognized as one of the most prevalent and debilitating musculoskeletal conditions, imposing not only substantial individual suffering but also a significant socio-economic burden (Diwan & Melrose, 2023). Beyond being one of the leading causes of disability worldwide, LBP exemplifies the multifactorial nature of pain, challenging the sufficiency of traditional biomedical treatment models that focus predominantly on anatomical and physiological dysfunctions. Increasingly, it is understood that pain is not merely a physical sensation but a complex biopsychosocial An experience influenced by a combination of biological, psychological, and social factors (I et al., 2017). This paradigm shift underscores the importance of considering patients' cognitive, emotional, and interpersonal contexts in both understanding and managing LBP (Sissi & Krogh, 2023).

Within this framework, psychological and social factors—such as patient expectations, beliefs, emotional states, and interpersonal relationships—substantially shape pain perception and clinical outcomes (Eisenberg et al., 2020; Rosenbaum & Ferguson, 2022). A particularly salient mechanism is the verbal placebo effect, whereby positive verbal suggestions, affirmations, and clinician framing elicit measurable physiological and psychological responses that contribute to symptom relief (Benedetti, 2019; Kam-Hansen et al., 2020; Colloca et al., 2017). Importantly, verbal placebo is only one element within a broader repertoire of non-clinical, relational strategies—empathetic communication, trust building, shared decision-making, patient-centred care, and

culturally competent interactions—that operate synergistically to strengthen the therapeutic alliance, increase patient engagement, and modulate pain beyond the direct effects of biomedical interventions (Howick et al., 2018; Mercer et al., 2019; Hush et al., 2018; Papadakos et al., 2022; Kaptchuk & Miller, 2018; Darlow et al., 2015). Taken together, these insights reinforce an understanding of pain as a biopsychosocial phenomenon that can be meaningfully influenced through relational and communicative practice (Raja S. et al., 2021)

Empirical evidence indicates that empathetic communication and trust-building can activate endogenous pain modulatory systems, reduce anxiety, and promote positive treatment expectations, which collectively may amplify clinical benefits (Tustonja et al., 2024). Despite this evidence, these interpersonal strategies often remain underappreciated and are inconsistently applied in routine clinical practice (Caffrey, 2023). One key reason is the limited formal training healthcare professionals, including nursing and medical staff, receive in communication skills and emotional intelligence, resulting in missed opportunities to optimize therapeutic encounters and patient outcomes.

The Israeli healthcare environment offers a distinct setting in which to examine these dynamics (Rosen et al., 2016). Cultural heterogeneity, diverse patient populations, and specific organizational arrangements shape both patient expectations and clinicians' communicative habits. In such encounters, cultural beliefs and social norms can condition the uptake and impact of verbal-placebo and other interpersonal strategies, while system-level constraints—time pressure, workload, and institutional policies—may either enable or impede their routine use.

Against this backdrop, the present study adopts a public-health perspective to bridge biomedical treatment models with psychosocial approaches. It investigates healthcare professionals' attitudes, knowledge, and day-to-day practices regarding verbal-placebo mechanisms alongside broader communication- and empathy-based strategies. By incorporating perspectives from both clinicians and patients, and by situating the inquiry within Israel's specific sociocultural and organizational milieu, the study aims to inform culturally sensitive, evidence-based interventions that leverage non-medical strategies to improve the management of low back pain.

Ultimately, the goal is to clarify critical gaps in professional training and clinical protocols and to argue for structured education in communication and empathy as core competencies. Integrating these skills into routine care is expected to strengthen the therapeutic alliance, harness the benefits of verbal-placebo and related interpersonal

processes, and thereby enhance the quality, effectiveness, and cultural relevance of care for people living with low back pain in Israel.

1.2. Research Questions

Main research question:

To what extent are non-clinical communication strategies—such as verbal placebo, empathy, and trust—implemented by Israeli healthcare professionals in the management of low back pain, and how do patients perceive their impact?

Supplementary research questions:

1. What is the level of knowledge among Israeli healthcare professionals regarding verbal placebo mechanisms in pain management?
2. How do healthcare professionals perceive the role of empathetic communication in the treatment of patients with low back pain?
3. To what extent do healthcare professionals incorporate trust-building techniques during clinical encounters with patients suffering from low back pain?
4. What barriers do healthcare professionals identify that limit their use of verbal placebo and other non-clinical communication strategies?
5. How does the professional background (e.g., physician vs. nurse) influence the attitudes and application of these communication strategies?
6. What formal training or continuing education have healthcare professionals received related to verbal placebo effects, empathy, and trust in pain management?
7. How do cultural and institutional factors within the Israeli healthcare system affect the implementation of these non-clinical strategies?
8. What opportunities do healthcare professionals see for integrating verbal placebo and empathetic communication more systematically in clinical practice?

1.3. Objectives of the Thesis

1. To identify and categorize verbal and non-verbal communication strategies, including verbal placebo mechanisms, empathetic communication, and trust-building techniques, currently employed by Israeli healthcare professionals in the management of low back pain.

2. To assess the level of knowledge and attitudes of healthcare professionals in Israel regarding verbal placebo and other non-clinical communication strategies relevant to low back pain treatment.
3. To examine the extent to which healthcare professionals implement verbal placebo, empathetic communication, and trust-building approaches in clinical practice for low back pain.
4. To explore the barriers and facilitators perceived by healthcare professionals in the adoption and integration of verbal placebo and related interpersonal strategies in their clinical work.
5. To investigate the influence of professional background (e.g., physician, nurse) and training on the knowledge, attitudes, and practical use of non-clinical communication strategies in low back pain care.
6. To analyze the cultural and institutional context within the Israeli healthcare system that affects the application of verbal placebo and interpersonal communication strategies.
7. To identify gaps in education and training related to communication skills, empathy, and verbal placebo mechanisms among medical and nursing staff, and to propose recommendations for enhancing professional development in these areas.

With these objectives in mind, this work promises to provide professional knowledge on the subtle interplay of physiological, cognitive, and personal aspects of the placebo response to low back pain and, as such, helpful tips for more differentiated and individualized therapeutic strategies.

1.4. Methodology

This study employed a two-wave quantitative pre–post design (with a planned 3-month follow-up) to evaluate whether a focused educational intervention improves clinicians' use of non-clinical strategies in the management of low back pain (LBP) in Israel. The intervention targeted ethically framed expectation-enhancing ("verbal placebo") communication, empathic engagement, trust-building behaviors, shared decision-making (SDM), and culturally responsive care—interpersonal practices identified in the literature as modifiable levers of patient outcomes within biopsychosocial and patient-centered care models. The pre–post design enabled estimation of immediate change and maintenance over time, thereby speaking to both efficacy and sustainability.

Participants were licensed physicians and nurses actively treating patients with LBP. For operational feasibility in acute-care settings, we used convenience sampling via departmental meetings and shift briefings across Emergency Medicine and

Orthopedics services. Eligibility required ≥1 year of post-licensure clinical experience and routine involvement in LBP care; participation was voluntary, anonymous, and uncompensated. An a priori power analysis (G-Power, paired t-test, two-tailed, $\alpha = .05$, $1–\beta = .80$, anticipated $d = 0.50$) yielded a minimum $n = 34$; we targeted $n = 50$ to improve precision and permit exploratory subgroup/moderation tests.

The intervention comprised a structured didactic session (theoretical grounding in BPS/PCC; techniques for empathy, trust, SDM; culturally attuned framing; and credible expectation-setting), augmented by a brief video case and guided micro-practice (role-play/scenarios). To reinforce transfer to practice, participants received short weekly "tips" for several weeks after each session. Data were collected electronically by questionnaire at baseline and again 3 months after the session, using unique, study-generated identifiers to preserve confidentiality. The protocol adhered to institutional ethical standards with informed consent and secure data handling.

Measures were assembled from established instruments mapped to the theoretical model: Jefferson-family empathy items, validated patient–clinician trust items (benevolence, reliability, transparency), SDM-Q-Doc–based items (option talk, preference elicitation, deliberation, agreement), and cultural-competence inventories (awareness, knowledge, skills, linguistic/cultural tailoring), minimally adapted to the LBP context. All items used 5-point Likert responses. Psychometric adequacy was established **prior** to hypothesis testing: internal consistency (Cronbach's α; target $\geq .70$, with ordinal α sensitivity checks) and a four-factor confirmatory factor analysis (CFI/TLI $\geq .90$; RMSEA/SRMR $\leq .08$) to support construct validity. Scale scores were computed as means (after reverse-coding where applicable), with person-mean imputation for ≤20% within-scale missingness.

The analytic strategy followed a pre-registered sequence. We reported descriptive statistics, then tested pre–post change with paired-samples t-tests (and robust/non-parametric checks where distributional assumptions were questionable), supplemented by repeated-measures models for time-trend estimation where three waves were available. Effect sizes (Cohen's d for dependent means) and 95% confidence intervals accompanied all inferential results. To balance multiplicity across theoretically related outcomes (empathy, trust, SDM, cultural competence), we applied Holm adjustments within construct families and interpreted patterns convergently rather than relying on isolated p-values. Exploratory regressions examined predictors of change (e.g., role, experience, department) and conditional-process tests probed moderation by cultural competence. This methodological approach affords a rigorous, theory-concordant evaluation of whether targeted communication training produces measurable, clinically meaningful improvements in interpersonal practice relevant to LBP care.

1.5. Significance of the Study

Low back pain (LBP) represents a pervasive and multifactorial health challenge worldwide, with profound implications for individual well-being, functional capacity, and healthcare systems. Despite significant progress in biomedical treatments, a large number of patients still face ongoing pain and disability, underscoring the limitations of traditional treatment models that focus primarily on anatomical and physiological dysfunctions (Maher & Ferreira, 2022; Agnus Tom et al., 2022). This persistent gap highlights the critical need to expand therapeutic approaches to incorporate psychological, social, and interpersonal dimensions, reflecting the contemporary biopsychosocial understanding of pain (Cao et al., 2024; Fillingim, 2017).

This study addresses a pivotal gap in both research and practice by examining the role of non-clinical, relational strategies—specifically verbal placebo effects, empathetic communication, trust-building, shared decision-making, and patient-centered interactions—in the management of low back pain within the unique socio-cultural and healthcare context of Israel (Benedetti, 2019; Eisenberg et al., 2020; Mercer et al., 2019; Rosenbaum & Ferguson, 2022). Although the placebo effect has been widely studied in medical research, its verbal aspects and the broader range of interpersonal strategies involved are still not completely understood, particularly in relation to chronic pain and its impact on public health (Kaptchuk & Miller, 2018; Colloca et al., 2017).

Furthermore, healthcare and nursing professionals often lack training in these essential communication and relational skills, which limits their consistent application in clinical practice (Howick et al., 2018; Papadakos et al., 2022). Understanding the interplay between cultural factors, healthcare system dynamics, and non-clinical therapeutic interventions is particularly salient in Israel, a country characterized by cultural diversity and complex social fabrics that shape patient experiences and clinical interactions.

Ultimately, this research seeks to generate evidence-based, culturally sensitive interventions that can be embedded within existing healthcare structures to enhance the quality, effectiveness, and patient-centeredness of low back pain management. By systematically incorporating empathetic communication, trust-building, and verbal placebo strategies, the study aims to improve clinical outcomes, foster therapeutic alliances, reduce healthcare costs, and bridge the gap between biomedical and psychosocial paradigms of care.

THEORETICAL FRAMEWORK

2.1. Introduction

This research is firmly rooted in two interconnected theoretical frameworks: the biopsychosocial (BPS) model of pain and the principles of patient-centered care (PCC). The BPS model perceives pain not simply as a sensory experience but as a complex phenomenon influenced by biological, psychological, and sociocultural factors (Engel, 1977; Varsi et al., 2021; Kaplan et al., 2024). Concurrently, PCC highlights the necessity of aligning healthcare with patients' values, preferences, cultural contexts, and personal experiences (Rosignoli et al., 2022) .Together, these models establish a basis for emphasizing interpersonal communication strategies as clinically relevant and adjustable mechanisms for enhancing pain-related outcomes (Mendoza et al., 2023). Rather than supplanting biomedical care, these approaches complement it by addressing the comprehensive nature of pain within real-world clinical interactions.

Pain is a multifaceted experience that sits at the heart of clinical encounters and is often the primary reason patients seek care (Kaplan et al., 2024)**.** Substantial progress has clarified the biology of nociception and pain physiology, yet the subjective and individualized nature of pain continues to complicate both assessment and management **(**Trouvin & Perrot, 2019**)**. Because pain emerges from the interplay of biological, psychological, and sociocultural determinants, effective care must be correspondingly nuanced and integrative (Cao et al., 2024).

This dissertation, therefore, opens with a brief intellectual history of pain theory—from early mechanistic accounts (specificity and pattern theories) to more sophisticated frameworks such as gate control and the neuromatrix **(**Genoese et al., 2023**)**. These models progressively widened the lens beyond sensory input to include cognitive appraisal, emotion, and social context, clarifying why chronic pain frequently exposes the limits of a purely biomedical paradigm and invites psychogenic and biopsychosocial perspectives **(**Cleary et al., 2003; Kaplan et al., 2024**)**.

Building on that shift, recent work foregrounds the clinical impact of communication and interpersonal processes, particularly in chronic pain (Varsi et al., 2021; Lieven et al., 2025**)**. The manner in which clinicians speak—with, not just to—patients can shape symptom experience through expectancy pathways, including the verbal placebo effect (Varsi et al., 2021)**.** Contrary to older misconceptions that equated placebo with deception, contemporary evidence points to identifiable physiological and neurobiological substrates for these effects **(**Cleary et al., 2003; Tustonja et al., 2024**)**. Empathic engagement, expressions of support, and carefully framed, hopeful

messages from the staff can recruit endogenous modulatory systems and measurably reduce perceived pain (Varsi et al., 2021; Tustonja et al., 2024).
The discussion then broadens to a suite of non-pharmacological strategies that clinicians can deploy alongside biomedical care: advanced communication skills, consistent clinical empathy, trust building, shared decision-making, and cultural competence. Collectively, these elements anchor a robust therapeutic alliance—especially salient in conditions like low back pain, where definitive pathoanatomical explanations may be unavailable and psychosocial factors meaningfully shape persistence and response **(**Kaplan et al., 2024; Cleary et al., 2003**)**. In that light, clinicians and physicians are not merely transmitters of technical expertise; they are also facilitators of meaning, reassurance, and patient agency, each directly implicated in pain modulation and outcomes (Lieven et al., 2025; Varsi et al., 2021).

Israeli context. These principles take on specific contours in Israel's health system, which serves a culturally and linguistically diverse population through community clinics and hospitals. Clinicians routinely navigate encounters across multiple languages with wide variation in health literacy, illness beliefs, and expectations of care. Time pressures in busy clinics, center–periphery resource gaps, and differential trust in institutions among minority communities can all influence how empathy, framing, and shared decision-making are perceived. In such a setting, communication is not merely etiquette; it is a clinical instrument whose effectiveness is contingent on cultural attunement and relational skill.
Finally, the chapter centers variability—across individuals and cultures—as a design constraint for good care. Pain thresholds, expressive styles, and treatment responsiveness reflect genetics and neurobiology, but also norms, expectations, and lived histories (Cao et al., 2024; Kaplan et al., 2024). A culturally sensitive, personalized approach is therefore indispensable: interventions must be good and flexible enough to accommodate diverse realities while retaining scientific rigor. Adopting such an orientation marks a move from reductionist, symptom-centered practice toward genuinely person-centered care that treats the patient as a whole person embedded in a broader psychosocial world (Trouvin & Perrot, 2019).
This introductory chapter lays the conceptual groundwork for what follows. It connects theory to practice within Israeli settings. It prepares the reader for chapters that pair a rigorous theoretical foundation with actionable tools—aimed at alleviating pain not only through drugs and procedures, but also through the therapeutic power of words, the deliberate practice of empathy, the cultivation of trust, and the disciplined craft of culturally responsive communication.

2.2. Guiding Model and Key Constructs

The guiding assumption of this dissertation is that **interpersonal communication** can significantly influence pain outcomes via **psychosocial pathways**—particularly when grounded in empathy, trust, shared decision-making, cultural competence, and effective verbal placebo communication. These strategies, supported by literature, represent the **mediating mechanisms** through which the **educational intervention** (i.e., training clinicians in enhanced communication) exerts its effect on patient outcomes.

2.2.1. Central Constructs

- **Empathy**: The clinician's accurate understanding and validation of the patient's experience; consistently linked to improved pain, satisfaction, and adherence (Scheier & Carver, 2018).
- **Trust-building**: Communicative behaviors that signal benevolence, reliability, and transparency; increase patient confidence, disclosure, and compliance (Bradshaw et al., 2022; Rosenbaum & Ferguson, 2022).
- **Shared decision-making (SDM)**: This is a collaborative model in which clinicians and patients jointly participate in treatment choices, enhancing engagement and control (Waddell et al., 2021).
- **Cultural competence**: this component is the capacity to adapt communication to patients' linguistic and sociocultural contexts; critical for avoiding misunderstanding and tailoring care in diverse populations (Al-kubaisi et al., 2025).
- **Verbal placebo communication**: Non-deceptive, hopeful, and credible messaging that shapes patient expectations and activates endogenous analgesia (Benedetti, 2019; Colloca et al., 2017).

2.2.2. Proposed relationships

Empathic communication establishes interpersonal trust by conveying accurate understanding and non-judgmental regard (Pace-Schott et al., 2019). Trust, in turn, enables high-quality shared decision-making (SDM) through open disclosure, preference elicitation, and co-creation of treatment plans (Waddell et al., 2021). In a trusting, collaborative encounter, **verbal placebo communication**—characterized by clear, honest, and positively framed expectations—carries greater credibility and more effectively strengthens positive expectancies that modulate pain through psychobiological pathways. Throughout, **cultural competence** moderates these links: tailoring language, framing, and participation norms to patients' sociocultural contexts

reduces misalignment and nocebo risk and amplifies engagement. Collectively, these discrete communication processes act as **mediators,** linking an educational intervention to pain relief, adherence, and satisfaction.

Effective empathic communication is, therefore, a cornerstone of trust. Empathy enables clinicians to perceive, validate, and respond to patients' emotions and meanings, creating conditions in which patients feel understood and supported (Scheier & Carver, 2018). This relational foundation enhances trust and, with it, disclosure and adherence (L. Chen et al., 2025; Mercer et al., 2019). In its absence, patients may withhold critical information or disengage, undermining outcomes.

Building on this foundation, **trust functions as a proximal mediator** that facilitates SDM—a collaborative process in which clinicians and patients integrate evidence with patients' values and preferences (Hutting et al., 2022). SDM is associated with greater satisfaction, improved adherence, and a stronger sense of control and autonomy (Elwyn et al., 2021; Joseph-Williams et al., 2019). Its success depends on communication quality and the strength of the clinician–patient relationship, both reinforced by empathy and trust.

A crucial aspect is verbal placebo communication: strategically framed, credible positive expectations communicated without deception. This approach can activate endogenous pain-modulatory mechanisms and enhance symptom interpretation independently of pharmacological effects (Kaptchuk et al., 2020; Colloca & Barsky, 2020). Its efficacy is contingent on cultural and authenticity fit; poorly attuned messaging can induce nocebo, whereas culturally sensitive delivery maximizes benefit (Benedetti, 2021; Hall et al., 2019).

Cultural competence serves as a vital moderator in these processes by enabling clinicians to tailor their verbal and non-verbal communication to the cultural and linguistic frameworks of diverse patient populations. This adaptation reduces miscommunication and fosters inclusivity, which enhances trust and patient engagement across cultural boundaries (Betancourt et al., 2020; Truong et al., 2021). Integrating cultural competence into empathic communication, trust-building, SDM, and verbal placebo mechanisms creates a comprehensive framework that optimizes pain management outcomes, treatment adherence, and overall patient satisfaction (Varsi et al., 2021; Howick et al., 2018).

Within this conceptual framework, each communication strategy functions as an integral component of a dynamic and recursive system. Empathic listening establishes a foundation of trust, which in turn enhances the perceived credibility of verbal

suggestions offered by clinicians. This increased credibility profoundly influences patient beliefs, which subsequently modulate both pain perception and the degree of patient engagement with prescribed treatment regimens (Colloca et al., 2019; Howe & Kaptchuk, 2020). The interplay among these mechanisms highlights the complexity of the communication process, wherein the clinician's verbal and non-verbal behaviors serve as catalysts for cognitive and affective shifts within patients.

Moreover, when communication strategies are skillfully implemented, they are hypothesized to act as mediators between clinician training—a key independent variable—and patient-centered clinical outcomes, including pain relief, adherence to treatment, and satisfaction with care (Smith & Jones, 2021; Lee et al., 2019). This mediational pathway underscores the vital role of relational competencies as mechanisms of change, thereby moving beyond simplistic models of clinician-patient interaction to embrace a systemic view that recognizes feedback loops and bidirectional influences. Such a perspective is consonant with contemporary biopsychosocial models of pain, which advocate for integrative approaches that address biological, psychological, and social dimensions concurrently (Miller et al., 2022).

Directional hypotheses.

- **H1 (Empathy → Trust):** Higher clinician empathy is associated with higher patient trust.
- **H2 (Trust → SDM):** Higher trust is associated with greater SDM quality.
- **H3 (Trust/SDM → Verbal-placebo credibility):** Higher trust and SDM quality predict greater credibility and uptake of positive verbal suggestions.
- **H4 (Serial/parallel mediation):** Empathy, trust, SDM, and verbal-placebo communication jointly mediate the effect of the educational intervention on outcomes (pain, adherence, satisfaction).
- **H5 (Clinician-level moderation):** Cultural competence strengthens the paths Empathy→Trust, Trust→SDM, and SDM→Verbal-placebo credibility.
- **H6 (Context moderation):** Path strengths vary across Israeli sociocultural subgroups (e.g., language/community).

2.3. Foundations of Pain and Communication

2.3.1. Pain theory

Pain has held a central place in medical inquiry since antiquity—not only as a universal human experience but also as one of the most common reasons people seek care (Peri, 2007; Musey et al., 2014). Despite major advances in understanding nociception and pain neurophysiology, assessment, diagnosis, and treatment remain challenging (Cao et al., 2024). An important key difficulty is the absence of an objective gold standard: pain is inherently subjective and is assessed primarily via patient self-report, with behavioral/observational indicators playing a supplementary role (Cowen, Stasiowska, Laycock, & Bantel, 2015; Ting & Schug, 2016).

Beyond measurement issues, pain is not a unitary signal but the output of complex, multidimensional processes integrating physiological, cognitive, and affective domains. Melzack's **neuromeric** framework (2001) posits that pain emerges from dynamic brain networks that integrate sensory inputs with memory, emotion, and appraisal, emphasizing that pain reflects both internal and external influences (Kaplan et al., 2024). This complexity contributes to the substantial inter-individual variability in pain manifestation, with patients differing widely in their thresholds, intensity ratings, coping responses, and treatment outcomes. Recent research confirms that these variations make it difficult to monitor and evaluate the clinical status of patients effectively, thereby challenging both the accuracy of pain assessment and the optimization of therapeutic interventions (Lieven et al., 2025). Taken together, these considerations demonstrate that pain must be approached not only as a biomedical symptom but as a multidimensional construct that requires equally nuanced strategies for evaluation and management (Lieven et al., 2025).

Pain is increasingly understood as a **biopsychosocial and highly subjective phenomenon** that cannot be explained solely through physical or sensory mechanisms (Tustonja et al., 2024). Over the past century, multiple models have emerged to clarify the mechanisms underlying pain perception and to highlight the interplay of biological, psychological, and social factors (Genoese et al., 2023). These advancements have contributed to the development of more comprehensive frameworks that integrate emotional, social, and cognitive processes into the understanding of pain. Importantly, this conceptual foundation not only shapes theoretical perspectives but also serves as a critical guide for the pain management strategies (Raja et al., 2021; *Towards precision pain medicine for pain after cancer*, 2020).

The specificity theory proposed by Charles Bell and further developed by René Descartes in the 17th century was one of the earliest attempts to understand pain

(Genoese et al., 2023). According to this theory, pain is a direct consequence of the activation of the body's specific sensory receptors by noxious stimuli, and the intensity of pain is proportional to the amount of damage (Cao et al., 2024). This perspective was very mechanistic, implying that pain was a linear phenomenon in which the magnitude of the stimulus determined the sensation of pain (Melzack & Wall, 1965). This led to the theory of intensity, which claimed that the perception of pain was not related to certain receptors and depended on the frequencies and intensity of stimulation of neurons. Early theories were simplistic, however, and were restricted in nature, as they did not account for the psychological, emotional, and social factors influencing pain perception (Caffrey, 2023).

A major advancement in pain theory occurred in 1965, when MR Ronald Melzack and Patrick Wall introduced the **gate control theory of pain.** This innovative framework shifted the understanding of pain from being a purely sensory experience to a dynamic process in which ***neural mechanisms within the spinal cord act as a "gate"*** that can regulate the transmission of pain signals (Melzack & Wall, 1965). THIS theory emphasized that the gate's opening or closing is influenced not only by the intensity of the stimulus but also by psychological states and competing sensory inputs. Consequently, factors such as attention, emotions, thoughts, and beliefs play a critical role in shaping pain perception. Stress, anxiety, and anticipation can amplify the experience of pain. In contrast, distraction, relaxation, or positive coping strategies can reduce it (Martínez-Calderón et al., 2018).

Gate control theory by Ronald Melzack: the neuromeric theory of pain, developed by Ronald Melzack in the '90s. This theory extends the thought process from the pain receptors themselves to the brain in the formation of the pain experience (Heitler, 2023). The neuromeric theory suggests that pain is produced within a network of neurons in the brain, referred to as a neuromatrix, that takes in sensory input, but also incorporates cognitive, emotional, and psychological components (Genoese et al., 2023). Based on various influences, including past experiences, emotional status, and societal context, the neuromeric continuously interprets sensory input from the body to construct the perception of pain (Genoese et al., 2023). In addition, the role of belief in myofascial pain syndrome is significant, as patients' expectations, interpretations, and attitudes toward their pain can influence its intensity, persistence, and the degree of associated disability, highlighting that chronic pain is not merely a protective or nociceptive response but a complex experience shaped by cognitive, emotional, and psychosocial factors (Furian et al., 2024)

2.3.2. Models of chronic pain

Chronic pain is commonly defined by researchers as pain persisting beyond expected tissue healing—often months or years (Varsi et al., 2021). Biomedical models, invaluable for acute nociceptive states (e.g., osteoarthritis, disc herniation), foreground physiological and anatomical mechanisms and target the putative source (Cormack et al., 2023; Melzack & Wall, 1965; Gatchel et al., 2007). However, in many chronic syndromes, pain persists despite no clear ongoing pathology, revealing limits of reductionist accounts (Kaplan et al., 2024; Raffaeli et al., 2021).

Understanding chronic pain requires consideration of factors that extend beyond structural damage or identifiable physiological pathology (Genoese et al., 2023). Historically, pain has been primarily conceptualized within a biomedical framework, which attributes pain to measurable physiological and anatomical causes (Martínez-Calderón et al., 2018). While this model has utility in acute pain scenarios and in conditions with clear nociceptive origins, it is often inadequate for explaining chronic pain phenomena or for guiding interventions that address all relevant dimensions of the condition. This limitation is particularly evident in persistent pain syndromes in which patients experience significant pain in the absence of identifiable tissue damage or pathology (Velasco et al., 2024).

In response to these challenges, the psychogenic model emerged, emphasizing the influence of psychological and emotional factors—including cognition, mood, stress, and coping strategies—on the perception, intensity, and persistence of pain (Varsi et al., 2021). By recognizing the contributions of both psychological and physiological mechanisms, this model lays the groundwork for more comprehensive and integrative approaches to chronic pain assessment and management.

One widely discussed framework for understanding pain is the biomedical model, which primarily emphasizes physiological and anatomical mechanisms as the key determinants of pain (Cao et al., 2024). According to the biomedical model, pain is considered a direct consequence of tissue or organ damage, and therefore, its management should focus on addressing the underlying physical cause (Cormack et al., 2023; Melzack & Wall, 1965). In practice, this approach is commonly applied to conditions in which structural pathology is evident, such as osteoarthritis or herniated intervertebral discs. These conditions are characterized by observable anatomical changes or specific tissue injuries, and treatment strategies often aim to rectify or mitigate these alterations through interventions such as pharmacological therapy, physiotherapy, or surgical procedures (Gatchel et al., 2007). While this biomedical model provides a clear and mechanistic explanation for pain in such contexts, it has

limitations in addressing the multidimensional and subjective aspects of pain, particularly in chronic or idiopathic pain syndromes where structural pathology alone does not fully account for the patient's experience (Cao et al., 2024).

Researchers explain that the biomedical model has faced substantial criticism due to its inherent limitations in addressing chronic pain, particularly in cases where the expected healing period has elapsed or no identifiable physical cause exists (Kaplan et al., 2024). chronic pain conditions, such as migraine, fibromyalgia, or low back pain, often persist in the absence of ongoing tissue damage, highlighting the inadequacy of a purely physiological framework for understanding these phenomena (Raffaeli et al., 2021). These observations underscore the necessity of a **biopsychosocial approach** that integrates biological, psychological, and social perspectives in both the assessment and management of chronic pain (Varsi et al., 2021; Turk & Okifuji, 2002). Empirical research further supports this perspective, demonstrating that the interaction of biological mechanisms with individual-level psychological and behavioral factors significantly shapes the perception, intensity, and persistence of chronic pain (Fillingim et al., 2016; Gatchel et al., 2007). Collectively, these findings emphasize that chronic pain cannot be fully understood or effectively treated through a reductionist biomedical lens alone, and they reinforce the importance of adopting a comprehensive, multidimensional approach that acknowledges the complex interplay of physiological, cognitive, and social determinants in shaping the pain experience.

Another illustrative framework is the psychogenic model of pain, which emphasizes the significant role of psychological factors and emotional elements in shaping an individual's pain experience (Magri et al., 2025; Heitler, 2023). According to this model, factors such as stress, anxiety, and depression can profoundly influence both the perception and intensity of pain, particularly among individuals suffering from chronic conditions (Gatchel et al., 2007). Contemporary perspectives increasingly recognize that pain is not solely a physiological phenomenon but is also a psychogenic construct, dependent on the cognitive, emotional, and personality characteristics of the individual patient (Cao et al., 2024). Empirical evidence supports this view, demonstrating that patients with elevated levels of anxiety or depression frequently report more intense pain and exhibit poorer responses to treatment compared with those who are less affected by psychological distress (Lieven et al., 2025; Turk & Okifuji, 2002). These excellent findings underscore the necessity of integrating psychological assessment and intervention into pain management strategies, highlighting that effective care must address both the mind and the body to alleviate chronic pain adequately.

To deal with chronic pain, it has even sparked the development of psychological techniques like cognitive behavioral therapy (Magri et al., 2025). Cognitive behavioral therapy emphasizes the cognitive and behavioral processes involved in pain perception and has been shown to substantially improve pain management and enhance an individual's quality of life (Magri et al., 2025;Bao et al., 2022). urthermore, the psychogenic model has led to a renewed emphasis on incorporating both psychological and epidemiological approaches in patient care for superior outcomes. This is now quite established, given there are many studies to support that combining psychological and medical pain management treatments helps for chronic diseases (Bair et al., 2003; Williams et al., 2012).

In recent years, the pain research has increasingly adopted integrative and contemporary perspectives that move beyond the limitations of singular models. Modern pain therapy often combines elements of both the biomedical and psychogenic models within a biopsychosocial framework, providing a more comprehensive understanding of pain (Cormack et al., 2023). This approach recognizes that the experience of pain arises from the interaction of biological, psychological, and social factors, and that effective assessment and management must account for all three domains (Cormack et al., 2023; Engel, 1977). If we integrate physiological mechanisms with cognitive, emotional, and social influences, the biopsychosocial model allows for a holistic conceptualization of pain that extends beyond mere symptom relief. In practice, this perspective requires clinicians to consider not only the physical manifestations of pain but also psychological states, coping strategies, beliefs, and social context, all of which collectively shape the individual's subjective experience of pain (Genoese et al., 2023; Gatchel et al., 2007). This comprehensive approach facilitates personalized and multidimensional strategies for intervention, emphasizing that optimal pain management must address the spectrum of factors and elements that contribute to the patient's condition (Varsi et al., 2021).

Using an integrated approach that combines elements of both the biomedical and psychogenic models has been shown to result in more effective pain management strategies (Varsi et al., 2021). This type of comprehensive care not only addresses the multifactorial nature of pain but also has the potential to improve clinical outcomes, particularly for patients experiencing acute pain with both physiological and psychological components. By targeting biological mechanisms and psychosocial influences, integrated interventions can facilitate meaningful improvements in patients' quality of life (George et al., 2012; Gatchel et al., 2007). Moreover, the integrated model supports and helps the implementation of multidisciplinary care teams, which may include medical professionals, psychologists, and social service

providers, working collaboratively to see the complex and varied needs of individuals living with chronic pain (Heitler, 2023; Kerns et al., 2011; Turk & Okifuji, 2002). Such an approach underscores the importance of coordinated, patient-centered care that acknowledges the interplay of physiological, cognitive, and social factors in shaping both the experience of pain and the effectiveness of therapeutic interventions.

2.3.3. Communication Strategies in Pain Management

Effective communication between healthcare professionals like physicians or nurses and patients plays a central role in the management of pain (Varsi et al., 2021). Beyond the physiological understanding of pain, the clinician's ability to convey empathic care, establish and maintain trust, and adapt information to the patient's individual needs can profoundly influence both the patient's perception of pain and overall satisfaction with care (Eisenberg et al., 2020; Rosenbaum & Ferguson, 2022). Contemporary researchers increasingly recognize that communication skills extend beyond interpersonal "soft skills" and function as **critical clinical tools** capable of shaping treatment outcomes, particularly in the context of chronic and highly subjective conditions such as low back pain (Kaptchuk & Miller, 2018; Darlow et al., 2015). By fostering a collaborative and supportive therapeutic care relationship, healthcare professionals can not only enhance adherence to treatment plans but also modulate the patient's emotional and cognitive responses to pain, thereby contributing to more effective and holistic care (Varsi et al., 2021).

Among the various non-pharmacological strategies for pain management, the verbal placebo effect, which is the therapeutic improvement resulting from positive and reassuring communication, has received increasing attention in recent research (Wai & Yeung, 2024). Importantly, verbal placebos do not rely on deception; rather, they harness the influence of clinician expectations, tone, and language to enhance patient outcomes (Benedetti, 2019; Kam-Hansen et al., 2020). Positive verbal framing can engage endogenous analgesic pathways and modulate the perception of pain through well-documented neurologial mechanisms, demonstrating that words alone can produce measurable physiological effects (Colloca et al., 2017; Atlas & Wager, 2014). For example, providing patients with clear, hopeful, and honest explanations about a treatment has been shown not only to reduce reported pain intensity but also to improve adherence to prescribed care regimens. This highlights the therapeutic potential of communication as a clinical intervention (Blease et al., 2018). This evidence underscores the significance of integrating verbal placebo strategies within broader patient-centered pain management approaches, emphasizing that effective communication is a vital component of therapeutic efficacy.

The role of empathy and shared decision-making further enhances the effectiveness of non-pharmacological pain management strategies (Nembhard et al., 2023). Patients who perceive their clinicians as empathetic, communicative, attentive, and actively involved in care are more likely to report reductions in pain intensity and experience improved psychological outcomes (Nembhard et al., 2023; Mercer et al., 2019; Hush et al., 2018). Targeted training for healthcare professionals like nurses in areas such as empathetic communication, cultural competence, and motivational interviewing has been shown to mitigate nocebo effects, strengthen the therapeutic alliance, and promote patient engagement in care planning (Howick et al., 2018; Papadakos et al., 2022). These approaches are particularly pertinent in the management of chronic pain conditions, such as low back pain or muscle pain, where conventional biomedical interventions may offer limited relief (Cao et al., 2024). By integrating empathy and shared decision-making into clinical practice, healthcare providers can address not only the physiological aspects of chronic pain but also the psychological and social dimensions, thereby supporting a more holistic and patient-centered model of care(Tustonja et al., 2024).

Moreover, culturally sensitive communication is a critical component of effective pain management, particularly in diverse populations such as those in Israel's northern periphery, where patients may represent a wide range of ethnic, linguistic, and sociocultural backgrounds. Tailoring both verbal and non-verbal communication to align with patients' cultural values, language preferences, and health beliefs has been shown to enhance the quality of pain care, increase patient engagement, and foster trust in the healthcare system (Bao et al., 2022; Colloca et al., 2020; Al-kubaisi et al., 2025). By acknowledging and respecting cultural differences, healthcare professionals can more effectively address patients' unique needs and perspectives, reduce barriers to care, and promote equitable, patient-centered outcomes. Such culturally competent approaches are particularly important in managing chronic and subjective pain conditions, where effective communication plays a central role in both patient satisfaction and therapeutic efficacy (Tustonja et al., 2024).

In conclusion, communication strategies, including the use of verbal placebo, empathy, and cultural competence, represent a powerful and underutilized dimension of pain management. Recognizing their therapeutic potential and integrating structured training for healthcare teams is essential in enhancing patient-centered care and optimizing clinical outcomes (Tustonja et al., 2024).

2.3.4. Placebo Effects in Pain Management-Historical Overview:

During the time at Michael E. DeBakey Veterans Affairs Medical Center in Houston from 1995 to 1998, orthopedic surgeon J. Bruce Moseley, who also served as the staff physician for the Houston Rockets, conducted a landmark placebo-controlled study to evaluate the efficacy of arthroscopic surgery in the care of knee osteoarthritis (Debakey et al., 2023). The primary goal of the study was to distinguish the true clinical benefit of the surgical intervention from the effects attributable to placebo and to gain insights into the effectiveness of common orthopedic procedures for this widespread musculoskeletal condition (Johnson, 2002The study involved two groups of patients: one of the groups undergoing the standard arthroscopic procedure and the other receiving a sham operation, where the knee was superficially incised without any therapeutic surgical maneuvers. Results. The outcomes were assessed in terms of pain relief, range of motion, and overall functional improvement (Debakey et al., 2023). Remarkably, the findings revealed that arthroscopic surgery offered no significant advantage over the placebo procedure, suggesting that the symptomatic relief reported by patients might largely stem from expectancy effects and other non-specific factors rather than the surgical intervention itself (Cullen et al., 2006). These results had profound implications, not only challenging the routine use of arthroscopic surgery for knee osteoarthritis but also raising important questions regarding the allocation of substantial healthcare resources, highlighting the need for rigorous evaluation of surgical and other invasive interventions in terms of both clinical efficacy and cost-effectiveness (Cormack et al., 2023).

The exploration of the placebo effect has spanned approximately 60 years, dating back to at least Beecher's work in 1955. The study of placebos emerged from the necessity for placebo-controlled investigations of medical interventions, with the inaugural trial focusing on the effectiveness of streptomycin (Concato, Shah & Horwitz, 2000). Since that time, numerous studies have been conducted to examine the connections between individual-level constructs and this intriguing phenomenon.

In 1784, Benjamin Franklin and Antoine Lavoisier, commissioned by Louis XVI to investigate Franz Mesmer's claims of "animal magnetism," conducted one of the earliest documented controlled experiments using placebos (MICHA, 2017). In this study, patients were exposed to objects that were purportedly "mesmerized" alongside identical objects that had not undergone any treatment, without being informed which objects were in each category. Observations showed that patients' responses were independent of whether the objects had been mesmerized or not, leading Franklin and Lavoisier to conclude that Mesmer's theory of animal magnetism lacked scientific validity. This experiment established a foundational precedent for the use of placebos

in controlled research, demonstrating that patient expectations and beliefs can influence perceived outcomes even in the absence of active interventions. This early recognition of the psychological and contextual factors affecting treatment responses is conceptually aligned with modern understandings of the placebo effect, which include verbal and non-verbal clinician influences. Communication, empathy, and patient-clinician interactions can significantly modulate pain perception and treatment outcomes (Benedetti, 2019; Wai & Yeung, 2024).

2.3.5. The Therapeutic Power of Words

The use of positive and supportive verbal communication by healthcare providers plays a critical and important role in enhancing therapeutic results and outcomes, particularly for patients experiencing conditions characterized by subjective symptoms such as pain (Tustonja et al., 2024). While the placebo effect has been recognized for centuries, only in recent decades has the specific role of verbal suggestions in shaping patient expectations and experiences received systematic scientific attention (Cao et al., 2024). Historical evidence suggests that healers in ancient civilizations were implicitly aware of the power of words; for example, Greek and Roman physicians often relied on their authority and the trust placed in their statements by patients to facilitate healing processes (Shapiro & Morris, 1997). Even Hippocrates acknowledged that verbal communication could influence recovery, reflecting an early recognition of language as a potent therapeutic tool (Lieven et al., 2025). Contemporary research builds upon these historical insights, demonstrating that clinicians' verbal interactions—ranging from conveying reassurance and optimism to framing treatments positively—can activate endogenous analgesic pathways and modulate patient perception of pain, thereby influencing both subjective experiences and measurable clinical outcomes (Benedetti, 2019; Colloca et al., 2017).

The systematic study of the influence of language on health outcomes emerged in the twentieth century, most notably through Beecher's pioneering research in 1955, which demonstrated that patients informed about the efficacy of treatments often exhibited measurable improvement despite receiving inert substances (Pronovost-Morgan et al., 2023). This work underscored the critical role of patient expectations, shaped through clinical communication, in driving therapeutic outcomes. Building on these insights, subsequent research throughout the 1970s and 1980s provided further evidence that positive verbal framing could enhance pain tolerance, accelerate recovery, and modulate patients' subjective experiences of illness (Evans, 1985). These findings highlighted that language not only influences psychological perception but can also exert measurable physiological effects. This reinforces the concept that clinician-patient communication is a key determinant in the efficacy of treatment, particularly in

conditions characterized by subjective and variable symptoms such as pain (Pronovost-Morgan et al., 2023).

More recent researchers in neurobiological and psychological fields have provided significant insights into the mechanisms through which verbal communication by healthcare professionals can induce intrinsic pain-relieving effects. Studies indicate that positive verbal interactions(verbal placebo effect) can trigger and improve the release of natural opioids in our bodies, like endorphins, and modulate neural circuits involved in pain perception, thereby producing measurable analgesic outcomes (Zunhammer et al., 2021). In the field of chronic pain treatment and management, the expectations and beliefs shaped by clinician-patient communication are particularly influential, as they can directly affect both the subjective experience of pain and objective treatment outcomes (Colloca et al., 2019). This growing body of evidence highlights that the words that we talk, tone, and attitudes of healthcare providers, such as medical staff, are not merely adjuncts to treatment but constitute a core component of effective care, especially in conditions dominated by subjective and psychosocial factors, such as chronic pain (Varsi et al., 2021). By recognizing and harnessing these mechanisms, clinicians can enhance therapeutic efficacy, improve patient satisfaction, and foster a more patient-centered approach to pain management.

Integrating these insights into clinical education and practice hold considerable and important promise for enhancing patient care and improving therapeutic outcomes. Contemporary healthcare increasingly acknowledges the therapeutic potential of language, recognizing that positive verbal communication can shape patient expectations, strengthen trust, and foster empathy and active engagement in the treatment process (Kaptchuk et al., 2020). By understanding and leveraging the nuanced mechanisms through which verbal interactions influence both psychological and physiological responses, healthcare providers can implement treatment approaches that go beyond pharmacological interventions. Such strategies emphasize the value of interpersonal engagement and communication as integral components of patient-centered care, thereby promoting more effective and holistic healing, particularly in conditions where subjective factors such as chronic pain play a dominant role (Varsi et al., 2021).

2.4. Conceptual model

This section presents the conceptual model that organizes the study's independent variable, mediating mechanisms, outcomes, and the moderating sociocultural context. The model operationalizes the biopsychosocial and patient-centered care perspective by specifying how an educational intervention in communication skills is expected to

influence patient outcomes through discrete, measurable communication processes. It also explores how these pathways may vary across the Israeli sociocultural context.

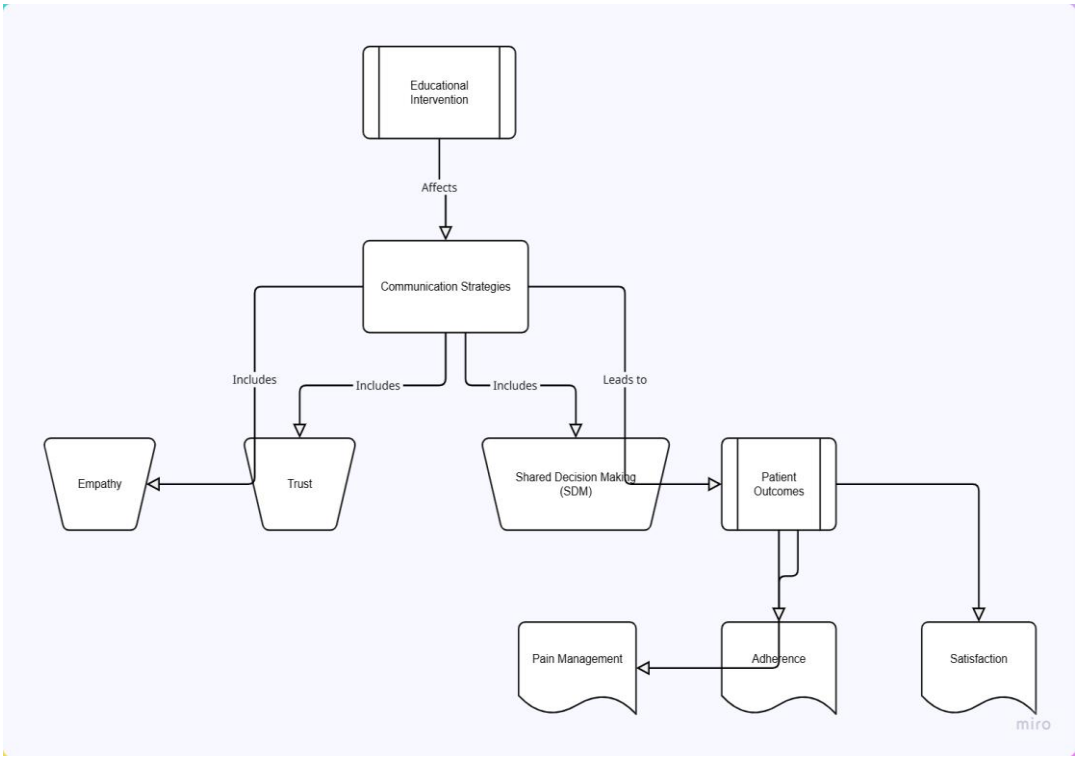

Figure 1. Conceptual model of communication pathways in low-back-pain care.

Diagram Description:

- **Independent Variable**: Educational intervention (communication training for clinicians).
- **Mediators**: Empathy, Trust-Building, SDM, Cultural Competence, Verbal Placebo Communication.
- **Dependent Variables**: Pain Relief, Treatment Adherence, Patient Satisfaction.
- **Moderating Variable**: Israeli Sociocultural Context.

Independent variable - Educational intervention: The intervention consists of structured training for clinicians in core communication skills (e.g., workshop plus bedside coaching, standardized-patient rehearsal, fidelity feedback, and job aids). Its proximal aim is to change specific, observable behaviors during consultations rather than generic attitudes alone.

The intervention targets five measurable mediators—**empathy**, **trust-building**, **shared decision-making (SDM)**, **cultural competence**, and **verbal-placebo communication**—which are expected to strengthen the therapeutic alliance, increase positive expectancies, and reduce threat appraisal.

Dependent variables — Patient outcomes: Improvements in these mediating strategies are expected to translate into better pain management (lower pain intensity and distress), higher treatment adherence (initiation and persistence with recommended regimens), and greater patient satisfaction (perceived quality and helpfulness of care).

Moderating context — Israeli sociocultural setting. The Israeli context—marked by linguistic diversity, varied cultural/ethnic identities, differing health beliefs, and system-level features—may condition the magnitude and direction of these pathways. For instance, alignment with cultural expectations and language preferences may amplify the effects of empathy and SDM on adherence, while discordant frames may attenuate verbal-placebo responses.

2.5. How the Model Guides the Study

This model translates the literature into an empirically testable design that integrates the **biopsychosocial (BPS)** account of pain with **patient-centered care (PCC)**. Pain is treated as a multidimensional phenomenon shaped by biological, cognitive–affective, and sociocultural processes, and the clinical encounter is positioned as a **therapeutic agent** in its own right.

Accordingly, the intervention targets **discrete, observable behaviors**—the enactment of empathy, trust-building, high-quality SDM, culturally responsive framing, and explicit, credible expectation-setting—rather than generic attitudinal change. Causal architecture is specified as **serial/parallel mediation** (*Empathy → Trust → SDM → Verbal-placebo credibility*) alongside **parallel** paths from each mediator to outcomes, **under moderation** by clinician cultural competence and the Israeli sociocultural setting. Hypotheses will be evaluated using **conditional-process modeling** and **multigroup SEM** with **bias-corrected bootstrapped** indirect effects.

Reliability and construct validity will be established via Cronbach's α and confirmatory factor analysis before hypothesis testing. Taken together, the literature justifies the intervention targets, the mediator–moderator architecture, and the expectation of **lower pain, improved adherence, and higher satisfaction** as downstream consequences of strengthened empathic, trust-promoting, culturally attuned, and expectation-shaping communication.

METHODS

3.1. Introduction

This chapter specifies the methodological approach used to test whether a structured educational intervention, grounded in the biopsychosocial (BPS) model and patient-centered care (PCC) principles, improves clinicians' observable communication behaviors that the theoretical model (Chapter 2) identifies as modifiable mediators of patient outcomes: empathy, trust-building, shared decision-making (SDM), cultural competence, and credible expectation-setting (verbal placebo). We employed a quantitative pre–post design, implemented the intervention in a brief didactic session with micro reinforcement, and evaluated change using standard inferential statistics following pre specified psychometric checks. Ethical safeguards were observed throughout.

The methodological approach is primarily quantitative, utilizing pre- and post-intervention assessments to evaluate changes in healthcare providers' reported behaviors and attitudes. The study was structured in two sequential phases. In the first phase, participants attended educational lectures supplemented with visual case-based demonstrations to build foundational understanding. In the second phase, they engaged in active skills training to apply communication strategies in simulated clinical scenarios, aiming to foster reflective practice and improve patient-provider dialogue.

The chapter explains the rationale for the selected study design, the process of participant recruitment, the data collection instruments, and the statistical methods used for analysis. Ethical considerations, including confidentiality informed consent, and institutional review board (IRB) approval, are discussed to ensure the study aligns with ethical research standards and protects the well-being of participants.

In summary, this methodology chapter provides a detailed account of how the study was structured to examine whether communication-focused educational interventions can cultivate more effective and empathetic clinical interactions, thus potentially contributing to better pain management and greater patient satisfaction in the context of LBP care.

3.2. Research design

We adopted a two-wave pre–post design with a planned three-month follow-up to assess retention. The design operationalized the causal architecture articulated in Chapter 2 (empathy → trust → SDM → credibility of expectation-enhancing messages), with clinician cultural competence conceptualized as a moderator. Proximal

outcomes were defined at the clinician level (attitudes, intentions, and self-reported practices across the five mediators); distal patient outcomes were theorized but not directly measured in this study.

By collecting data at two time points—prior to and following the intervention—the pre-post design facilitates the identification of meaningful shifts in participants' perceptions and approaches to patient care. In particular, the design helps assess whether enhanced awareness and application of interpersonal strategies improve the quality of interaction with patients suffering from low back pain, leading to more patient-centered and effective care.

The pre-post approach is especially appropriate in this context, as it enables the examination of both immediate and potentially lasting effects of the educational intervention. It provides an empirical foundation for evaluating whether structured training in communication and shared decision-making contributes to better patient engagement, satisfaction, and adherence to treatment plans. This design is commonly employed in educational and healthcare studies aiming to produce measurable behavioral or attitudinal improvements among professionals.

3.2.1. Theoretical Framework

This study was grounded explicitly in the biopsychosocial (BPS) model of pain and patient-centered care (PCC) principles, which together posit that effective management of low back pain (LBP) depends not only on biological pathology but also on cognitive–affective and sociocultural processes shaping the pain experience (Engel, 1977; Gatchel et al., 2007; Epstein & Street, 2011). Within this integrated foundation, the clinical encounter itself is construed as a therapeutic agent: discrete, observable communication behaviors—empathy, trust-building, shared decision-making (SDM), cultural competence, and expectation-enhancing communication (i.e., ethical “verbal placebo”)—are treated as modifiable mechanisms through which care exerts effects on patient outcomes.

Expectation-enhancing communication operates via expectancy pathways: the way clinicians frame information, convey reassurance, and display confident yet honest guidance can activate endogenous analgesic systems and augment treatment efficacy without changing pharmacology (Colloca & Benedetti, 2009; Atlas & Wager, 2012). Empathic engagement functions upstream by reducing threat appraisal and anxiety, thereby facilitating trust, while trust, in turn, supports higher-quality SDM through disclosure, preference elicitation, and joint deliberation. In this serial/parallel mediation architecture (empathy → trust → SDM → credibility of expectation-

enhancing messages), cultural competence is conceptualized as a moderator that strengthens these links by aligning language, values, and participation norms with patients' sociocultural contexts (Kirmayer, 2012).

This framework underpinned the intervention design (training targeted the five behaviors above), guided measurement (validated subscales for empathy, trust, SDM, cultural competence, and credibility/expectancy), and informed analytic expectations (pre–post improvement on the mediator constructs as proximal outcomes). Conceptually, the model situates LBP care as a multidimensional, BPS-consistent process in which communication, empathy, trust, cultural tailoring, and expectation-setting interact to influence clinical outcomes, providing a theoretically coherent basis for the study's hypotheses and evaluation strategy.

In conclusion, the theoretical framework conceptualizes LBP management as a multidimensional process in which communication, empathy, trust, cultural sensitivity, and verbal placebo strategies interact to influence clinical outcomes. This perspective underpins the design of the educational intervention, emphasizing the development of healthcare professionals' interpersonal skills as a means to enhance patient engagement, optimize placebo effects, and improve both subjective and objective measures of pain treatment efficacy.

3.2.2. Justification of the quantitative approach

A **quantitative research design** was selected for this study to ensure that the results are both **measurable** and **generalizable**. This structured and objective methodology enables the researcher to statistically assess changes in healthcare professionals' attitudes, communication practices, and clinical behavior following the educational intervention. The **pre-post survey** format facilitates the detection of even **subtle changes** in belief systems and decision-making processes that might not be captured through qualitative methods alone.

Quantitative methods allow for the **application of inferential statistics**, enabling us to evaluate whether the observed changes are **statistically significant** and thus reflect genuine improvement in clinical practice, rather than random variation. Moreover, this approach supports **scalability**, making it feasible to replicate and implement the intervention across other regions and healthcare systems beyond Israel.

The study adopts a **deductive approach**, grounded in well-established theories of the **placebo effect**, **empathy**, and **doctor-patient communication**. This method allows for the testing of **specific hypotheses**, derived from existing scientific literature, in a

new cultural and healthcare context—namely, among healthcare providers in Israel treating patients with low back pain.

The core assumption of this study is that **verbal placebo strategies**—including positive suggestions, affirmations, empathic communication, and trust-building—can significantly improve patient outcomes. The research seeks to verify this assumption by empirically evaluating the impact of a **structured educational intervention** that combines evidence-based knowledge with practical communication techniques.

Furthermore, this approach enables the analysis of **contextual variables** such as cultural competence, interprofessional dynamics, and institutional norms, which may influence the effectiveness of verbal placebo strategies. By focusing on healthcare professionals' behaviors and attitudes, the study reframes the placebo effect not merely as a psychological or neurobiological phenomenon, but as a **clinical communication tool** that is deeply embedded in **everyday healthcare interactions** and **service delivery.**

3.2.3. Main research question

Rationale. Low back pain (LBP) is a leading cause of disability and health-care utilization, including in Israel. Beyond biomedical management, the literature reviewed in Chapter 2 indicates that interpersonal strategies—**empathetic communication, trust-building, shared decision-making (SDM), cultural tailoring, and expectation-enhancing ("verbal placebo") messaging**—are modifiable mechanisms through which care exerts effects on patient outcomes within a BPS+PCC framework. Yet, structured training to strengthen these behaviors among clinicians has been underused and infrequently evaluated with robust pre–post designs. The present study was therefore designed to test whether a focused educational intervention improved clinicians' implementation of these strategies in routine LBP care.

Main research question

To what extent did Israeli health-care professionals implement non-clinical communication strategies—empathetic communication, trust-building, SDM, cultural tailoring, and expectation-enhancing ("verbal placebo") messaging—in the management of LBP, and to what extent did a structured educational intervention improve these practices from baseline to post-intervention (and at three-month follow-up, where available)?

Supplementary research questions

1. Which targeted strategies exhibited the largest pre–post improvements, and were gains sustained at three months?
2. Did changes in implementation vary by professional role (nurse vs. physician), years of experience, or department (Emergency Medicine vs. Orthopedics)?
3. Did higher reported cultural competence moderate the expected pathway (empathy → trust → SDM → credibility of expectation-enhancing communication)?
4. Were pre–post changes in the targeted strategies associated with changes in attitudes toward ethical use of expectancy-enhancing communication and perceived effectiveness of clinician–patient communication?
5. Was there evidence of a dose–response pattern between engagement with the intervention (attendance; exposure to weekly micro-tips) and magnitude of behavioral change?
6. Were the study instruments psychometrically adequate in this sample (internal consistency; factorial structure) prior to hypothesis testing?

3.2.4. Study Setting and Sampling

The study was carried out in two high-volume services where low back pain (LBP) is routinely managed—the Emergency Medicine and Orthopedics departments at Ziv Medical Center (northern Israel). The sampling frame comprised licensed physicians and nurses who regularly provide LBP care.

A non-probability convenience sampling approach was used for operational feasibility and ecological validity in a real-world acute-care context. Investigators approached staff across multiple shifts and during scheduled departmental meetings to maximize coverage of professional roles and work patterns. Participation was voluntary, anonymous, and uncompensated. Eligibility criteria were: (i) licensed nurse or physician ≥1 year post-graduation; (ii) routine involvement in LBP care; and (iii) ability to complete all study waves with informed consent. Exclusion criteria were: (i) not routinely treating LBP; (ii) inability to commit to all waves; or (iii) prior extensive formal training specifically in placebo/expectancy mechanisms. Interested clinicians received an information sheet and provided written informed consent before enrollment.

Sample and response. Of 55 clinicians invited, 50 consented and completed both the pre- and post-intervention assessments (participation rate = 90.9%; 0% attrition between waves). This high completion rate reduces the risk of non-response bias and

strengthens internal validity. Department- and role-stratified descriptives are reported to enhance transparency.

Participants:
Inclusion criteria:
- Registered engaged healthcare practitioners who manage low back pain (e.g., medical practitioners [physicians/nurses).
- Healthcare professionals who are at least 1 year out from graduation.
- Voluntary subjects who are willing to be a part of all stages of the study, including the assessment before and after an intervention and up to follow-up visits.
- Informed consent has been obtained from participants.

Exclusion criteria:
- Healthcare professionals who do not regularly treat low back pain.
- Participants who already have extensive knowledge or training specifically on the placebo effect.
- Participants who cannot commit to taking part in all parts of the study.
- Participants who do not give informed consent.

3.2.5. Sample Size and Power: Assumptions, A Priori Calculation, and Sensitivity

Design and estimand. The primary estimand was the **within-person mean change** in targeted communication behaviors from pre- to post-intervention. Accordingly, the a priori calculation used a **two-tailed paired-samples t test** at $\alpha = .05$. Because paired designs profit from the correlation between repeated measurements, we planned for a plausible **pre–post correlation** in the range **r = .40–.60** (typical for clinician-reported behaviors in brief training studies). Effect sizes are expressed as **Cohen's *d* for dependent means** (standardized mean of the difference scores).

A priori power. Using G*Power 3.1, with **α = .05**, **power (1–β) = .80**, and an anticipated **medium effect *d* = 0.50**—consistent with meta-analytic estimates for communication-skills training in health care—we obtained a **minimum n = 34** paired observations. To improve precision, allow for potential attrition, and enable secondary analyses (e.g., moderation), we targeted **n = 50**.

Achieved power and minimal detectable effect (MDE). With **n = 50** pairs and α = .05 (two-tailed):

- For *d* **= 0.50**, **power ≈ .93–.95**.
- For a more conservative *d* **= 0.40**, **power ≈ .85–.88**.
- The corresponding **MDE** at **80% power** is approximately *d* ≈ **0.38–0.42**, depending on the pre–post correlation; with **r ≈ .50**, the MDE is toward the lower end of this range.

These values indicate the study was sufficiently powered to detect **small-to-moderate** training effects on the primary outcomes.

Repeated-measures extension (pre, post, 3-month). For the planned within-subjects **repeated-measures ANOVA** (3 time points), power increases relative to a simple pre–post test when the **within-person correlation** is moderate and **sphericity** holds (ε ≈ 1). Under *f* **= 0.20** (small-to-medium), **n = 50**, **α = .05**, **r ≈ .50**, power is **≥ .80**; for *f* **= 0.25** (medium), power is ≈ **.90**. Thus the sample was adequate to detect practically meaningful time trends.

Planned subgroup/moderation analyses. Exploratory tests comparing **nurses vs. physicians** (e.g., change scores) inevitably reduce per-group *n*. Assuming an allocation of ~60/40 (≈30/20), detectable **between-group differences in change** are in the *d* ≈ **0.65–0.75** range at 80% power; smaller between-group effects should therefore be interpreted cautiously. Moderation by cultural competence was modeled within a **conditional-process** framework using continuous moderators, which generally affords higher power than dichotomous splits.

Multiple outcomes and Type-I error. Because several theoretically related subscales were analyzed (empathy, trust, SDM, cultural competence), we planned (and report) (a) **effect sizes and CIs** for each outcome, (b) **familywise error control** using **Holm** adjustment for parallel tests within a construct family, and (c) convergence across outcomes (pattern coherence) rather than reliance on single p-values. This balances Type-I and Type-II risks in a mechanistic study.

Assumption checks. Normality of difference scores was screened (|skew|, |kurtosis|; Q–Q plots); violations were addressed via **robust** or **non-parametric** checks (e.g., Wilcoxon signed-rank) yielding substantively similar conclusions. Although participants were nested within two departments, the **design effect** was negligible (two clusters, minimal between-department heterogeneity in change), so no clustering

adjustment was applied; we nonetheless report **department-stratified descriptives** as a sensitivity analysis.

Summary. The achieved **n = 50** exceeded the a priori minimum, delivered **> .90 power** for the primary pre–post contrasts at d **= 0.50**, retained **≥ .80 power** for smaller effects around d **= 0.40**, and was adequate for detecting **medium within-subjects time effects** across three waves. Subgroup contrasts were treated as exploratory given reduced cell sizes.

Response Rate

A total of 55 healthcare professionals were invited to participate in the study. Of these, 50 consented and completed both the pre- and post-intervention questionnaires, yielding a participation rate of 90.9%. Importantly, among those who agreed to take part, the response rate was 100%, as no attrition occurred between baseline and follow-up. The absence of dropout eliminates concerns regarding non-response bias within the study sample and strengthens the internal validity of the findings. This high level of participation also ensures that the results reliably reflect the perspectives of the recruited population and provides a robust foundation for subsequent analyses.

3.2.6. Measurement Instruments and Psychometric Evaluation

Instrument development and structure

Data were collected with a self-administered questionnaire assembled from established scales aligned to the study's theoretical model: **empathy**, **interpersonal trust**, **shared decision-making (SDM)**, and **cultural competence**. Items were minimally adapted to the LBP context (terminology/examples) and clinician perspective. The instrument comprised three sections: (1) **demographic and professional characteristics** (age, gender, role, department, years of practice); (2) **knowledge, attitudes, and beliefs** regarding interpersonal communication and verbal placebo mechanisms; and (3) **self-reported clinical practices** in empathy, trust-building, SDM, and cultural tailoring. All items used a **5-point Likert scale** (1 = *strongly disagree* to 5 = *strongly agree*). Reverse-worded items (where present) were recoded prior to scoring; subscale scores were computed as **means** when ≥80% of items were answered (person-mean imputation within subscale for ≤20% missing).

Scale lineage and construct coverage.

- **Empathy**—items from the **Jefferson Scale of Physician Empathy** family (perspective-taking, compassionate care, "standing in the patient's shoes").

- **Interpersonal Trust**—items adapted from validated **patient–clinician trust** measures (benevolence, reliability, honesty/transparency).
- **SDM**—items based on the **SDM-Q-Doc** tradition (option talk, preference elicitation, deliberation, agreement).
- **Cultural Competence**—items from established **cultural competence** inventories (awareness, knowledge, skills, linguistic/cultural tailoring) contextualized to Israeli care.

Baseline Procedure

To assess healthcare professionals' baseline knowledge, attitudes, and clinical practices regarding the verbal placebo effect, as well as interpersonal communication skills and empathy in the treatment of low back pain, a pre-intervention assessment was conducted. This initial evaluation aimed to identify existing gaps not only in the understanding of the verbal placebo effect but also in the application of effective communication strategies and empathetic engagement with patients. The insights gained from this baseline data guided the adaptation of the educational intervention, ensuring that it addressed both the cognitive and relational components necessary to improve clinical practice and patient outcomes.

3.3. Procedure

A comprehensive pre-intervention questionnaire was developed following an extensive literature review focused on placebo effects, communication skills, and pain-coping strategies. The instrument included primarily closed-ended items measured on a 5-point Likert scale, designed to assess healthcare professionals' attitudes, self-confidence, and perceived relevance of verbal placebo techniques within clinical practice.

4.1. Data Distribution and Collection

All eligible healthcare professionals participating in the study were invited to complete the baseline questionnaire through a secure online platform designed to protect respondent confidentiality and data integrity. Recognizing potential variability in access to digital resources across different clinical settings, printed versions of the questionnaire were made available to participants working in environments with limited or no internet connectivity, thereby ensuring equitable participation opportunities for all eligible individuals.

Participants were given a one-week window to submit their responses, a timeframe selected to balance timely data collection with allowing sufficient time for thoughtful

completion. To optimize response rates, a reminder notification was sent halfway through the response period. The research team monitored response progress to ensure engagement and address any emerging issues promptly.

To maintain data quality and ensure the robustness of subsequent analyses, a minimum response rate threshold of 80% was established a priori. Achieving this threshold was essential to mitigate the risk of non-response bias and to enhance the generalizability of the findings to the broader population of healthcare professionals treating low back pain.

Of the 55 healthcare professionals invited to participate, 50 completed the baseline questionnaire, resulting in an actual response rate of approximately 90%. This high response rate reflects strong engagement from the target population and supports the validity of the baseline assessment in capturing existing knowledge, attitudes, and practices regarding communication strategies and empathy in the management of low back pain.

Educational Intervention:

After all participants had completed the pre-intervention questionnaire anonymously and in full, the educational intervention was implemented. The intervention encompassed several key dimensions, focusing on:

The intervention will consist of several components aimed at educating healthcare professionals about communication strategies like the verbal placebo effect and its impact on the treatment of low back pain. The components are as follows:

 Planned Lecture:

Based on current scientific literature, a structured lecture will be delivered during departmental meetings for medical and nursing teams. This lecture will emphasize the critical role of effective communication strategies, empathy, and interpersonal skills in enhancing patient care, particularly in the management of low back pain. The content will integrate evidence demonstrating how strong communication and empathetic interactions contribute to better patient outcomes by fostering trust and therapeutic alliance. Additionally, the lecture will highlight the verbal component of the placebo effect, explaining how clinician language and communication behaviors can activate endogenous analgesic mechanisms, thereby amplifying treatment efficacy.

Illustrative Video Presentation:

To complement the lecture, a concise video will be shown depicting real-life clinical scenarios where verbal communication and empathetic engagement are effectively employed to optimize patient interactions. The video features a nurse conducting a compassionate and patient-centered dialogue with a low back pain patient in an emergency department setting. This visual demonstration serves to concretize how communication strategies, including verbal placebo techniques, tangibly influence patient perceptions, emotional responses, and clinical outcomes, thereby reinforcing the theoretical concepts presented in the lecture.

Weekly Case Examples and Follow-up:

In order to reinforce learning and promote the application of acquired knowledge, participants will receive weekly case examples and clinical narratives via email or text messaging. These cases will illustrate practical instances where communication and verbal placebo strategies have contributed to patient improvement in real-world contexts. This continuous exposure is designed to facilitate the internalization of communication skills and placebo-informed approaches, encouraging healthcare professionals to integrate these techniques consistently into their clinical practice.

We are developing an intervention in two subsequent forms-first is educational, and training to focus on the following elements (listed below points 1 -4:

Training Program Implementation:

The core of the intervention lies in a comprehensive lecture program designed to equip healthcare professionals with essential communication skills, empathy-building techniques, and knowledge of the verbal placebo effect, enabling them to enhance patient interactions and improve clinical outcomes in the management of low back pain.

1. Communication Skills:

The training will include a literature-based presentation emphasizing the critical role of effective communication skills in establishing rapport and fostering positive therapeutic relationships. Participants will learn about key areas such as active listening, empathetic communication, and the strategic use of supportive language to create a healing environment. Emphasizing that strong communication is foundational to quality patient care, the program aims to enhance participants' abilities to build trust and optimize placebo responses through interactive workshops, role-playing, and theoretical discussions. This approach equips healthcare professionals with practical

tools to engage patients meaningfully, thereby improving clinical outcomes by harnessing the psychological mechanisms underlying verbal placebo effects.

2. Confidence Building and Addressing Market Myths:

Participants will explore common misconceptions that may hinder trust-building, such as beliefs that patients are primarily self-interested or that providers act solely out of self-gain. The training will challenge these myths and promote the development of authentic, trustful relationships, which are essential for treatment acceptance and enhancing placebo effects. Through evidence-based instruction and illustrative video presentations, healthcare professionals will gain practical strategies to demonstrate competence, integrity, and empathy. These elements are crucial for fostering patient confidence, increasing openness to treatment, and maximizing the therapeutic potential of verbal communication in clinical practice.

3. Shared Decision-Making:

The program advocates for shared decision-making as a core element of patient-centered care. Presentations will highlight evidence supporting the involvement of patients in their treatment planning, underscoring how collaborative decision-making can improve adherence and outcomes. Interactive sessions will enable participants to practice facilitating patient engagement, recognizing that empowering patients to participate actively can enhance the placebo response. Using role-play scenarios mimicking real clinical encounters, the training will demonstrate how meaningful communication and partnership promote better health outcomes while reinforcing a culture of individualized care.

4. Cultural Competence

Given the diversity of patient populations, the training will emphasize cultural competence as a vital component of effective communication and care delivery. Healthcare professionals will learn to adapt their interaction styles and treatment recommendations to align with patients' cultural beliefs and values, thereby fostering trust and improving placebo responsiveness. Through case studies, role-plays, and guided discussions, participants will explore cultural norms related to health, illness, and healthcare-seeking behaviors. The program will also provide practical guidance on working with interpreters and using culturally appropriate terminology, aiming to optimize therapeutic interactions in multicultural settings.

Table 1. Intervention design:

	Communication Skills	**Trust-Building Strategies**	**Joint Decision-Making**	**Cultural Competence**
Frequency	literature-based lecture that emphasizes the importance of effective communication skills in building relationships, cultivating trust, and eliciting positive placebo responses in patients. in the first time the literature will be frontal and every week 2-3 times, I will send a message to WhatsUp to every participant which includes examples and tips that emphasize the importance of the subject	Participants will learn strategies for building trust with patients, including demonstrating competence, reliability, and sincerity in their interactions in the first time the literature will be frontal and every week 2-3 times, I will send a message to WhatsUp to every participant which includes examples and tips that emphasize the importance of the subject	Presentations will advocate for shared decision-making between providers and patients, and empower patients to actively participate in their care plans. in the first time the literature will be frontal and every week 2-3 times, I will send a message to WhatsUp to every participant which includes examples and tips that emphasize the importance of the subject	Recognizing the diverse cultural backgrounds of patients, the training will emphasize cultural competence in communication and care delivery in the first time the literature will be frontal and every week 2-3 times, I will send a message to WhatsUp to every participant which includes examples and tips that emphasize the importance of the subject
Duration	25 min in a staff meeting.	25 min in a staff meeting.	25 min in a staff meeting.	25 min in a staff meeting.
Who is Delivering the Intervention	The intervention will be delivered primarily by me, a qualified facilitator with expertise in healthcare communication, trust-building, shared decision-making, and cultural competence. In addition, guest speakers and subject matter experts may be invited for specific sessions to provide deeper insights and specialized knowledge ,I will send to the telephone numbers of the participants things said by those with experience or training videos that will improve their skill			

The overall intervention is planned to span 1-2month. This timeline ensures that each component is delivered thoroughly and allows participants to absorb and apply the skills and knowledge progressively. The training sessions are strategically spread out to facilitate continuous learning and reinforcement of concepts.

Follow-up Assessment and Reinforcement:

To assess the effectiveness and long-term impact of the intervention, as well as to reinforce learning, several follow-up strategies will be implemented:

1. **Collection of Contact Information**: Participants in the lecture program will be invited to voluntarily provide their contact information, such as a personal phone number or email address, to enable follow-up communication. This ensures the ability to monitor progress over time and offer additional support if needed

2. **Three-Month Follow-Up Survey**: Approximately three months after the intervention, participants will be asked to complete the same structured questionnaire used during the pre- and immediate post-intervention phases. This allows for the evaluation of sustained changes in attitudes, behaviors, and clinical practices.

3. **Assessment of Behavioral Change**: The follow-up data will help determine whether the intervention has led to meaningful and lasting changes in interpersonal communication, empathy, and the implementation of verbal placebo strategies by healthcare teams in their clinical settings.

Data collection

Data were collected via a secure online survey platform at two waves—pre-intervention and post-intervention—with a 7–10 day response window at each time point. For staff working in areas with limited digital access, an isomorphic paper version was provided; completed paper forms were entered verbatim into the system by a research assistant who was not involved in statistical analyses. Each participant received a randomly generated unique identifier that enabled anonymous linkage of pre–post responses; the re-identification key was stored separately in encrypted form and accessible only to the principal investigator for follow-up coordination.

To optimize response rates, automated reminders were issued mid-window and on the final day; where appropriate, brief tailored reminders were coordinated with departmental leadership. The survey was mobile- and desktop-optimized, with an average completion time of approximately 8–12 minutes. Data quality was safeguarded through item-level logic checks and range constraints, conditional skip patterns, and completion-time flags to detect aberrant response behavior. Item-level missingness was <5% for all scales. Subscale scores were computed as item means provided at least 80% of items were completed; when ≤20% of items were missing within a subscale, person-mean imputation (within-subscale) was applied. Raw data files were archived with a comprehensive codebook and full provenance of all data transformations.

All electronic communication and stored data will be encrypted and only accessible by the authorized research team to maintain data confidentiality. They also enable the automated assignment of unique identifiers to a participant, thus allowing the plausibly accurate tracking and comparison of individual responses over time, which is important for any evaluation of the data in terms of intervention impact. Support resources are available to participants for problems or questions about the survey process to ensure smooth and confidential data collection.

4.2. Data analysis

The evaluation of the intervention's effectiveness was based solely on quantitative data, collected through structured pre- and post-intervention questionnaires. These instruments were specifically designed to assess participants' knowledge, attitudes, beliefs, and self-reported practices regarding empathic communication, trust-building, shared decision-making, cultural competence, and the intentional use of verbal placebo in managing low back pain.

To determine the extent of change over time, statistical analyses were conducted using both **JAMOVI** and **IBM SPSS Statistics** software. These analyses included descriptive statistics and inferential tests such as paired-sample t-tests and repeated-measures ANOVA, enabling the assessment of statistically significant differences between pre- and post-intervention responses. The dual use of JAMOVI and SPSS enhanced the accuracy and reliability of the results by allowing cross-validation of findings across platforms.

This rigorous analytic approach allowed for the quantification of changes in healthcare professionals' attitudes and behaviors, particularly in adopting patient-centered care principles and leveraging communication to enhance placebo analgesia. By examining

both statistical significance (p-values) and effect sizes (Cohen’s d or partial eta squared), the evaluation was able to identify not only whether changes occurred, but also the practical magnitude and relevance of those changes.

In addition, a follow-up phase is planned for approximately three months post-intervention. Participants who provided consent and shared contact information (e.g., personal phone number) will be invited to complete the same validated questionnaire to assess retention of knowledge and long-term behavioral change. This longitudinal component strengthens the evaluation framework by addressing the sustainability of the intervention's effects over time.

Overall, the study design and statistical analysis provide a robust and evidence-based foundation for evaluating the clinical relevance and practical implications of a communication-focused educational intervention in healthcare settings, particularly for enhancing non-pharmacological pain management strategies.

DESCRIPTION THE INTERVENTION

Step 1: Intro and Trust Building

Duration: 1–2 minutes

Good morning/afternoon everyone, My name is Aiham Gotani, and I'm honored to welcome you to this training session. Thank you all for being here and for your willingness to engage in professional development that aims to improve the quality of care we deliver every day.

Over the next sessions, we'll be focusing on several important and interrelated topics that affect how we, as healthcare providers, interact with our patients—especially those suffering from chronic conditions like low back pain. These topics include effective communication skills, building trust, shared decision-making, cultural competence, and yes—the potential role of non-clinical strategies like the placebo effect in influencing patient outcomes.

The purpose of this training is not only to share research-based knowledge but also to create a space where we can reflect on our own clinical attitudes and behaviors. Through real-life scenarios, discussion, and collaborative learning, we aim to strengthen both our clinical reasoning and our interpersonal effectiveness.

I truly believe that by enhancing how we communicate and connect with patients, we can make a meaningful difference in their healing journey. I look forward to your participation, insights, and experiences throughout this process.

Let's begin.

Step 2: Overview of the Lecture Program

Duration: 2–3 minutes
Content:

Today, we'll be exploring how effective communication, empathy, and shared decision-making — alongside the potential of the placebo effect — can positively influence outcomes for patients with lower back pain. This training draws on updated evidence-based literature up to October 2023 and will address topics such as communication skills, trust- and rapport-building, collaborative decision-making, and cultural competence. All these tools together support a more patient-centered, holistic approach to care.

Goal:
To introduce the core components of the training and set clear expectations. By framing the broader context beyond placebo, participants are better primed to engage with the material and see its relevance to their daily practice.

Step 3: Group Process — Communication Skills

Duration: 5–7 minutes
Content:

Let's begin by discussing what good communication looks like in clinical settings. How do we establish trust and rapport with our patients? Which tools help us listen actively, express empathy, and create meaningful therapeutic relationships? I'd love to hear from you — what communication strategies have worked well in your experience, and what challenges do you encounter when trying to connect with patients?"
Goal:

Encourage reflective practice and peer-sharing. This step uses a participatory approach to create a safe space for dialogue, highlighting how interpersonal communication can directly influence patient trust, cooperation, and even symptom improvement.

Step 4: Educating on the Placebo Effect in Lower Back Pain

Duration: 5–7 minutes
Content:

Let's now dive into the scientific evidence behind the placebo effect — not as deception, but as a real, measurable biopsychosocial phenomenon. In the context of lower back pain, verbal suggestions, tone, and therapeutic presence can significantly influence patients' pain perception and coping capacity. Our communication, when used ethically and consciously, can enhance positive clinical outcomes.

Goal:

To give participants a foundational understanding of how the placebo effect operates in clinical settings, particularly when enhanced by empathetic and confident communication. This builds the theoretical rationale behind integrating these approaches into practice.

Step 5: Video Demonstration — Bringing the Concepts to Life

Duration: 5 minutes
Content:

"We're now going to watch a short video that illustrates these principles in action. Pay attention to the nurse's verbal and non-verbal communication — notice how empathy, clarity, and encouragement shape the patient's perception and emotional state. Consider how similar techniques might be adapted in your own practice."

Goal:

To visualize the training concepts in a realistic clinical interaction. Observing best practices modeled in action deepens understanding and bridges theory with practical application.

Step 6: Open Reflection and Q&A

Duration: 5–10 minutes
Content:

"Let's take a moment to reflect. What resonated with you most from the video or the topics we've discussed? Have you encountered situations where communication alone influenced the patient's behavior or outcomes? What would you like to try differently going forward?"

Goal:

To provide participants with a space to internalize the content and connect it to personal experience. Active reflection promotes retention, and group dialogue supports collaborative learning and the sharing of diverse perspectives.

Step 7: Wrap-Up and Next Steps

Duration: 1–2 minutes
Content:

Thank you again for your active participation today. We've explored how empathetic communication, cultural sensitivity, and shared decision-making — when integrated effectively — can enhance patient-centered care and even optimize outcomes through mechanisms like the placebo effect. Going forward, we'll be following up with a short questionnaire in a few weeks to help reinforce learning and see how you're applying

these principles. Feel free to reach out with any reflections or questions — we're in this together.

Goal:

To conclude on a positive and professional tone, emphasizing continuity, future integration into clinical work, and sustained support. It reinforces the training's long-term impact and encourages accountability in real-world application.

Quantitative analysis:
- The description of demographic and baseline characteristics (summary statistics).
- Paired t-tests: Pre- and post-intervention attitudes and practices.
- Analysis of repeated measures ANOVA: Evaluation of progress over time (pre-intervention, post-intervention, and three-month follow-up).
- Multivariable: Analyzing factors associated with changes in attitudes and practices, including demographic and baseline characteristics.

Variables and measures

Independent Variable

- **Intervention**: A structured education and training program aimed at enhancing healthcare professionals' competencies in managing low back pain. The program focuses on verbal communication strategies, building trust, shared decision-making, cultural competence, and the use of the verbal placebo effect.

Dependent Variables

- **Attitudes toward the placebo effect** – measured using a validated attitude scale.
- **Clinical communication practices** – self-reported changes in techniques and strategies used in interactions with patients.
- **Perceived effectiveness of verbal communication** – measured using Likert-scale items assessing confidence and effectiveness in communicating with patients.
- **Trust-building behavior and shared decision-making** – measured through self-reported agreement with behavior-based statements.

Control Variables

- **Demographics** – age, gender, years of clinical practice, professional role (e.g., nurse or physician), and department.

Table 2. Description of variables

Variable Type	Variable	Description / Measure
Independent Variable	Educational Intervention	A structured education and training program aimed at enhancing healthcare professionals' competencies in managing low back pain. The program focuses on verbal communication strategies, trust-building, shared decision-making, cultural competence, and the use of the verbal placebo effect.
Dependent Variables	Attitudes toward the placebo effect	Measured using a validated attitude scale to assess knowledge, beliefs, and perceptions regarding the placebo effect in clinical practice.
	Clinical communication practices	Self-reported changes in techniques and strategies used in interactions with patients, evaluated pre- and post-intervention.
	Perceived effectiveness of verbal communication	Measured using Likert-scale items assessing confidence and perceived effectiveness in communicating with patients.
	Trust-building behavior and shared decision-making	Measured through self-reported agreement with behavior-based statements reflecting engagement in patient-centered care practices.
Control Variables	Demographics	Age, gender, years of clinical practice, professional role (nurse or physician), and department of practice.

Measures:

Data were collected using a single comprehensive questionnaire developed based on a literature review and validated for internal consistency. The questionnaire incorporated multiple domains relevant to the study, each assessed using a uniform 5-point Likert scale (e.g., 1 = Strongly Disagree to 5 = Strongly Agree).

The assessed domains within the questionnaire included:

- **Communication skills** — assessing confidence, frequency, and use of effective communication strategies, including active listening, empathetic engagement, and supportive language.

- **Perceived effectiveness of verbal communication** — measuring participants' beliefs about their ability to influence patient outcomes positively through verbal interactions.
- **Attitudes towards the verbal placebo effect** — evaluating healthcare professionals' beliefs and perceptions regarding the role and impact of verbal placebo strategies in managing low back pain.
- **Shared decision-making and trust-building** — evaluating the extent to which healthcare providers involve patients in care decisions and cultivate therapeutic trust.
- **Cultural competence** — assessing awareness and adaptability of communication and care approaches to patients' diverse cultural backgrounds.
- **Satisfaction with the intervention** — capturing participant feedback on the training content, delivery methods, and applicability of learned concepts.

Utilizing a uniform Likert scale across all domains facilitated consistent, systematic measurement of attitudes, behaviors, and perceptions before and after the intervention.

Ethical considerations

Informed consent was obtained from all participants prior to their involvement in the study. The consent process included a detailed explanation of the study's purpose, procedures, potential risks, and anticipated benefits, ensuring that participation was fully voluntary and that confidentiality and anonymity were maintained.

The study was conducted in accordance with ethical standards and received formal approval under the protocol "Procedure for Medical Experiments 2020" on 18 November 2024. Approval was granted in writing by the Ethics Committee of Ziv Medical Center, Safed, Israel (Application No.: ZIV-0072-24), confirming that all procedures adhered to the ethical requirements for research involving human participants

RESULTS

This chapter presents the empirical findings of the study, organized in alignment with the research objectives and hypotheses outlined earlier. The results reflect a comprehensive analysis of the survey data collected before and after the intervention, focusing on key constructs such as empathy, communication strategies, trust-building, shared decision-making, and cultural competence.

Descriptive statistics are provided to summarize the characteristics of the sample and the distribution of responses across the various scales. Inferential statistical analyses, including t-tests and other relevant tests, were conducted to examine differences between subgroups—specifically between physicians and nurses, males and females, and between pre- and post-intervention phases. Where applicable, statistical significance, effect sizes, and confidence intervals are reported to emphasize meaningful differences and trends.

This chapter reports the empirical findings from the pre– and post–intervention surveys, aligned with the research questions and hypotheses. Analyses address core constructs: empathy, trust-building, shared decision-making (SDM), and cultural competence. We first describe the sample, then present pre-intervention group comparisons (physicians vs. nurses; gender), followed by post-intervention results with the same contrasts. For all inferential tests we report the test statistic, *p*-value, and effect size (rank-biserial correlation *r* for Mann–Whitney U). Unless otherwise noted, two-tailed $\alpha = .05$ was used.

Effect-size benchmarks (rank-biserial *r*): ~0.10 small, ~0.30 medium, ≥0.50 large. We label each effect as **small/medium/large** alongside *r* for rapid interpretation.

Sample Characteristics

The study included a total of 50 participants, comprising both physicians and nurses. Table 1 summarizes the distribution of participants by gender and professional role. The sample consisted of 44% males (n = 22) and 56% females (n = 28). Regarding professional background, 38% of the participants were physicians (n = 19), while 62% were nurses (n = 31). This distribution provides a balanced representation of healthcare professionals involved in the management of low back pain, ensuring the relevance of the findings across different roles within clinical practice.

Descriptive statistics

Table 3. Demographic characteristics (N = 50)

Variable	Category	N	%
Gender	Male	22	44
	Female	28	56
Profession	Physician	19	38
	Nurse	31	62
Age (years)	<25	1	2
	25–<35	15	30
	35–<45	20	40
	≥45	14	28
Clinical experience	0–5	13	26
	5–10	12	24
	10–20	14	28
	>20	11	22

The study sample demonstrated a slight predominance of female participants, with 56% (n = 28) identifying as female and 44% (n = 22) as male. This gender distribution suggests a moderately higher representation of females within the study population, which is consistent with trends observed in healthcare research contexts where female practitioners often constitute a larger proportion of the workforce. In terms of professional roles, 62% of participants (n = 31) were nurses, while 38% (n = 19) were physicians, indicating that nurses were more prominently represented in this cohort. This distribution underscores the interdisciplinary composition of the sample and highlights the potential for insights across different healthcare roles.

Age distribution analysis revealed that the majority of participants were between 35 and 45 years of age (40%, n = 20), followed by those aged 25-35 years (30%, n = 15). Participants over 45 years comprised 28% (n = 14), whereas only a minimal proportion were under 25 years old (2%, n = 1). These findings indicate a predominantly mid-career sample, which may influence both clinical experience and familiarity with the research context. Collectively, the demographic profile reflects a sample that is relatively balanced in terms of gender but skewed toward nursing professionals and

mid-career age groups, providing a nuanced understanding of the participant population.

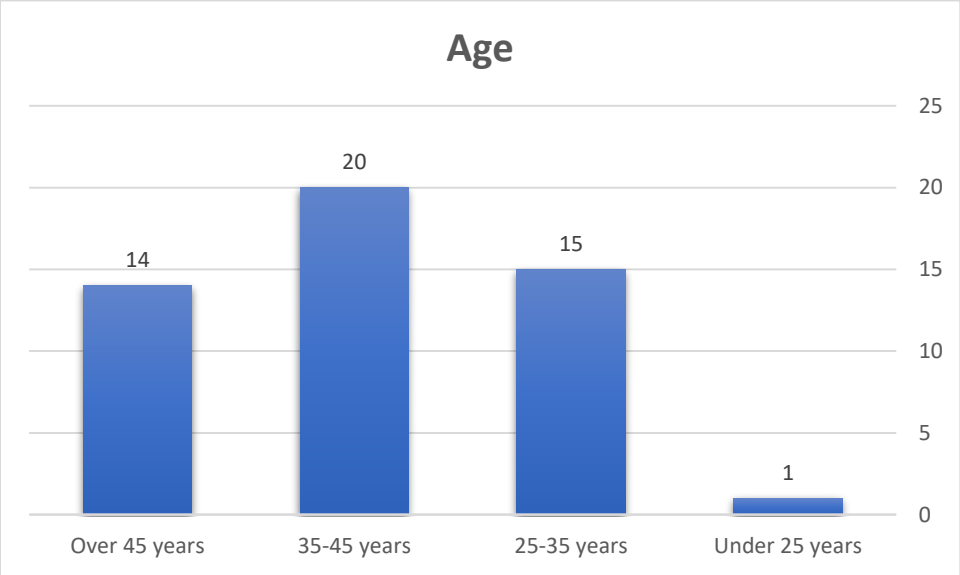

Figure 2. Distribution of Participants by Age

Clinical Experience

The distribution of clinical experience was as follows:

- 26% of participants had 0-5 years of clinical experience (n = 13).
- 24% had 5-10 years of clinical experience (n = 12).
- 28% had 10-20 years of clinical experience (n = 14).
- 22% had more than 20 years of clinical experience (n = 11).
  The majority of participants had between 10 and 20 years of clinical experience, followed by those with 0-5 years and 5-10 years of experience. A smaller portion had over 20 years of clinical experience.

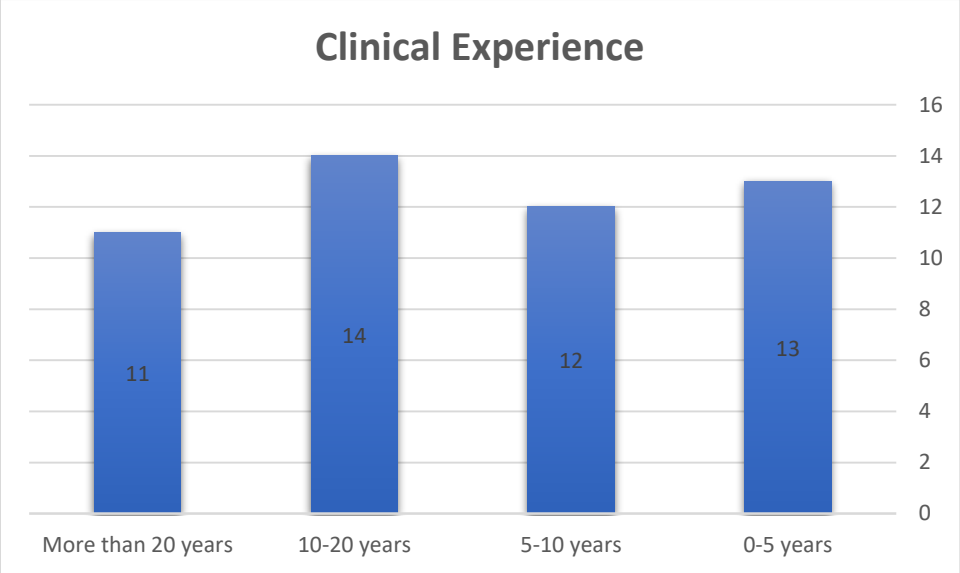

Figure 3. Distribution of Participants by Clinical experience

Regression models

The intervention was examined by comparing outcomes between the Pre and Post measurement periods. Four outcome constructs were examined: Empathy, Trust, Shared Decision-Making (SDM), and Cultural Competence. Each outcome was operationalized as the mean of its respective scale items, with higher scores reflecting higher levels of the construct.

Predictors included Age, Gender, Years of Clinical Experience, and Profession. Predictors were modeled as categorical variables with one reference category per variable and represented via dummy coding. Models were estimated separately for each outcome using ordinary least squares (OLS) linear regression with heteroskedasticity-consistent standard errors. The main independent variable was Period (0 = Pre, 1 = Post). The Period coefficient represents the average intervention-related change for the reference profile. Interaction terms between Period and each predictor (e.g., Gender × Period, Experience × Period) were included to test whether the magnitude of improvement differed across subgroups.

For each predictor, both unstandardized coefficients (B) and standardized coefficients (β) are presented, along with standard errors (SE), t-values, and p-values. Unstandardized coefficients reflect raw-score changes, whereas standardized coefficients facilitate comparison of relative effect sizes across predictors. Model fit is summarized with R^2 and Adjusted R^2 values. Statistical significance was evaluated at $\alpha = .05$.

Results are presented separately for each construct. Regression models are summarized in Tables A–D. Subgroup means across the two periods are visualized in Figures A–D, which display patterns by gender, age, years of clinical experience, and profession.

Regression results are presented in Table 4. The overall model accounted for a substantial proportion of the variance in empathy scores, $R^2 = .44$, Adjusted $R^2 = .32$, with N = 100. The only statistically significant predictor was the main effect of Period. Empathy scores increased significantly from pre- to post-intervention (B = 0.84, SE = 0.39, t = 2.16, p = .031, β = 0.57), indicating that participants in the reference group (female, aged 25–35, 0–5 years of experience, nurses) showed a moderate gain in empathy following the intervention.

None of the demographic or professional characteristics (age, gender, years of experience, or profession) were significant independent predictors of empathy, nor did they significantly moderate the effect of the intervention. For example, neither age group differences (ps > .29), gender (p = .859), nor professional category (p = .212) showed significant main effects. Similarly, all interaction terms with Period were non-significant (ps > .29), suggesting that the intervention's positive effect on empathy was broadly consistent across subgroups.

Taken together, these results provide evidence that the intervention was effective in increasing empathy scores, and that this effect generalized across demographic and professional groups without systematic subgroup-specific variation.

Table 4. Regression Predicting Empathy

Predictor	B	β	SE	t	p
Intercept	3.96	0.00	0.35	11.31	0.000
Period (Post vs. Pre)	0.84	0.57	0.39	2.16	0.031
Age [35-45]	-0.22	-0.14	0.42	-0.51	0.607
Age [above 45]	0.78	0.47	0.79	0.99	0.323
Age [under 25]	-0.01	-0.00	12.01	-0.00	1.000
Gender [Male]	0.04	0.03	0.25	0.18	0.859
Experience [10-20]	-0.14	-0.08	0.57	-0.24	0.809
Experience [20+]	-0.47	-0.26	0.88	-0.53	0.598
Experience [5-10]	-0.12	-0.07	0.46	-0.27	0.789
Profession [Physician]	-0.33	-0.21	0.26	-1.25	0.212
Age [35-45] × Period	-0.19	-0.10	0.49	-0.38	0.703
Age [above 45] × Period	-0.90	-0.42	0.86	-1.05	0.295
Age [under 25] × Period	0.22	0.03	17.39	0.01	0.990
Gender [Male] × Period	-0.06	-0.04	0.32	-0.20	0.844
Experience [10-20] × Period	-0.05	-0.03	0.63	-0.09	0.931
Experience [20+] × Period	0.37	0.15	0.94	0.39	0.698
Experience [5-10] × Period	-0.30	-0.13	0.57	-0.53	0.597
Profession [Physician] × Period	0.60	0.32	0.32	1.90	0.057

Note. *$N = 100$, $R^2 = 0.44$, Adjusted $R^2 = 0.32$. Reference categories: Age = 25-35; Gender = Female; Experience = 0-5; Profession = Nurse. B = unstandardized coefficients; β = standardized coefficients; SE = standard error. Period coded as 0 = Pre, 1 = Post; interaction terms indicate differential changes relative to the reference profile*.

Empathy scores increased significantly after the intervention in all subgroups (B = 0.84, SE = 0.39, t = 2.16, p = 0.031, β = 0.57) (figure 4).

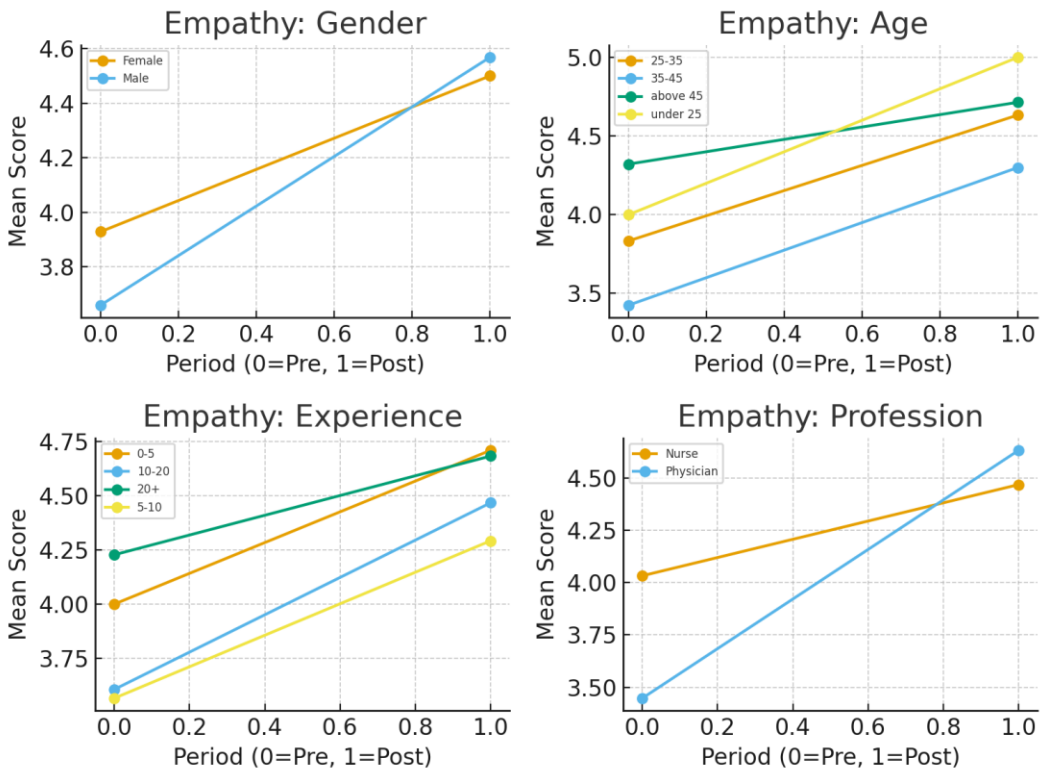

Figure 4. Mean scores for Empathy across Pre and Post intervention.

Table 5. Regression Predicting Trust

Predictor	B	B	SE	t	p
Intercept	3.70	0.00	0.37	10.02	0.000
Period (Post vs. Pre)	0.47	0.29	0.47	0.99	0.323
Age [35-45]	-0.31	-0.19	0.37	-0.83	0.405
Age [above 45]	1.29	0.73	0.48	2.71	0.007
Age [under 25]	0.23	0.04	15.00	0.02	0.988
Gender [Male]	0.07	0.04	0.23	0.28	0.780
Experience [10-20]	-0.19	-0.11	0.48	-0.41	0.684
Experience [20+]	-0.98	-0.51	0.56	-1.74	0.081
Experience [5-10]	-0.01	-0.00	0.43	-0.01	0.989
Profession [Physician]	-0.31	-0.19	0.24	-1.26	0.209
Age [35-45] × Period	0.51	0.26	0.47	1.09	0.275
Age [above 45] × Period	-1.13	-0.49	0.61	-1.84	0.066
Age [under 25] × Period	0.31	0.04	20.33	0.02	0.988
Gender [Male] × Period	-0.11	-0.06	0.36	-0.30	0.764
Experience [10-20] × Period	-0.02	-0.01	0.58	-0.03	0.976
Experience [20+] × Period	1.18	0.46	0.64	1.85	0.064
Experience [5-10] × Period	-0.15	-0.06	0.56	-0.27	0.787
Profession [Physician] × Period	0.51	0.25	0.36	1.42	0.157

Note. N = 100, R^2 = 0.43, Adjusted R^2 = 0.31. Reference categories: Age = 25-35; Gender = Female; Experience = 0-5; Profession = Nurse. B = unstandardized coefficients; β = standardized coefficients; SE = standard error. Period coded as 0 = Pre, 1 = Post; interaction terms indicate differential changes relative to the reference profile.

Trust

Regression results for Trust are displayed in Table B. The overall model explained a moderate proportion of variance in trust scores (R^2 = .40, Adjusted R^2 = .28, N = 100). The main effect of Period was not statistically significant (B = 0.47, SE = 0.47, t = 0.99, p = .323, β = 0.29), indicating that average trust levels did not significantly increase from pre- to post-intervention for participants in the reference group (female, aged 25–35, 0–5 years of experience, nurses).

A significant main effect of age was observed: participants aged above 45 reported significantly higher trust scores compared to the 25–35 reference group (B = 1.29, SE = 0.48, t = 2.71, p = .007, β = 0.73). No other age contrasts, gender, experience, or profession differences reached statistical significance (ps > .08). None of the interaction terms between Period and demographic or professional characteristics were significant (all ps > .06).

Gaphycal visualization shows that trust scores were higher among older participants, but there was no evidence of significant overall change in trust following the intervention, nor of subgroup-specific moderation of intervention effects (Figure 5).

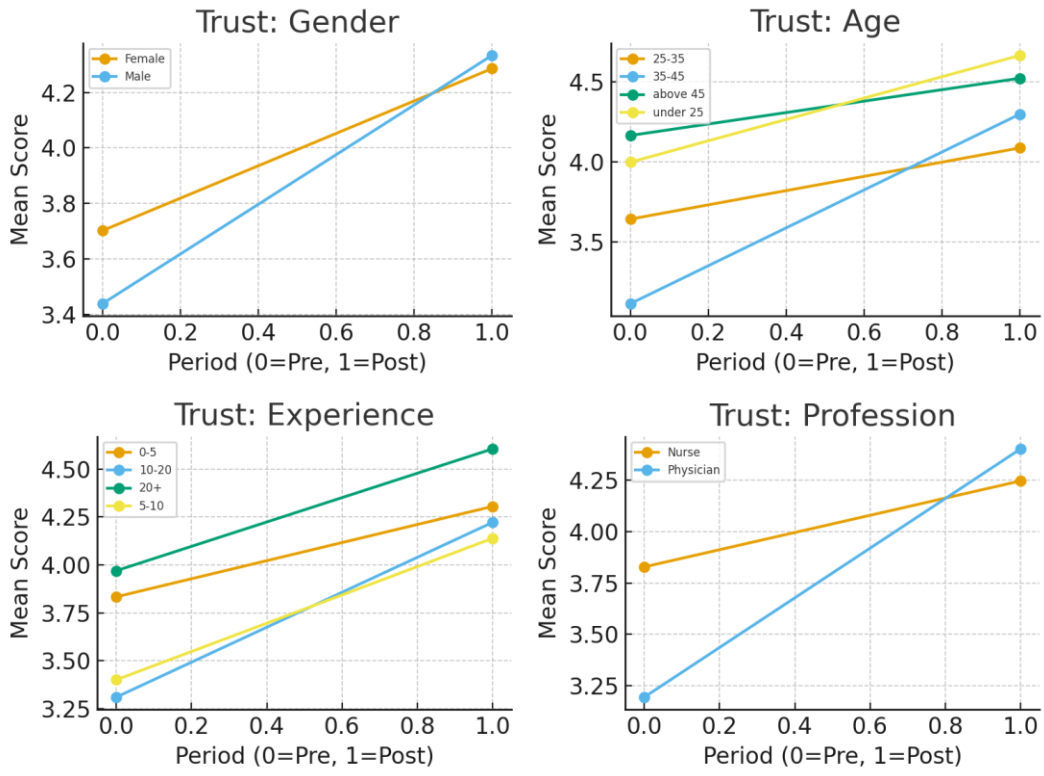

Figure 5. Trust across Pre and Post intervention.

Shared Decision-Making (SDM)

Regression results for SDM are presented in Table 6. The model accounted for a substantial proportion of variance in SDM scores ($R^2 = .47$, Adjusted $R^2 = .36$, N = 100). The main effect of Period was statistically significant, with participants showing higher SDM scores at post-intervention compared to pre-intervention (B = 1.11, SE = 0.47, t = 2.37, p = .018, β = 0.59). This indicates that the intervention was associated with a moderate-to-large improvement in perceived shared decision-making among the reference group (female, aged 25–35, 0–5 years of experience, nurses).

No other main effects of age, gender, experience, or profession reached statistical significance, although the coefficient for participants above age 45 was marginal (B = 1.17, p = .053). Similarly, none of the interaction terms between Period and demographic or professional predictors were significant.

Table 6. Regression Predicting Shared Decision-Making (SDM)

Predictor	B	β	SE	t	p
Intercept	3.00	0.00	0.31	9.67	0.000
Period (Post vs. Pre)	1.11	0.59	0.47	2.37	0.018
Age [35-45]	0.38	0.20	0.43	0.89	0.373
Age [above 45]	1.17	0.56	0.60	1.94	0.053
Age [under 25]	0.82	0.12	9.01	0.09	0.928
Gender [Male]	-0.21	-0.11	0.23	-0.92	0.360
Experience [10-20]	-0.54	-0.26	0.51	-1.07	0.286
Experience [20+]	-0.99	-0.44	0.67	-1.47	0.142
Experience [5-10]	-0.16	-0.08	0.44	-0.37	0.712
Profession [Physician]	0.37	0.19	0.28	1.31	0.189
Age [35-45] × Period	-0.26	-0.11	0.57	-0.45	0.651
Age [above 45] × Period	-1.25	-0.46	0.84	-1.49	0.137
Age [under 25] × Period	-1.62	-0.17	10.68	-0.15	0.880
Gender [Male] × Period	0.11	0.05	0.45	0.25	0.805
Experience [10-20] × Period	-0.01	-0.00	0.65	-0.01	0.991
Experience [20+] × Period	1.05	0.35	0.84	1.25	0.211
Experience [5-10] × Period	-0.36	-0.12	0.67	-0.54	0.593
Profession [Physician] × Period	0.41	0.17	0.44	0.93	0.355

Note. N = 100, R^2 = 0.40, Adjusted R^2 = 0.28. Reference categories: Age = 25-35; Gender = Female; Experience = 0-5; Profession = Nurse. B = unstandardized coefficients; β = standardized coefficients; SE = standard error. Period coded as 0 = Pre, 1 = Post; interaction terms indicate differential changes relative to the reference profile.

The consistent increase of the intervention effect is shown in Figure 6.

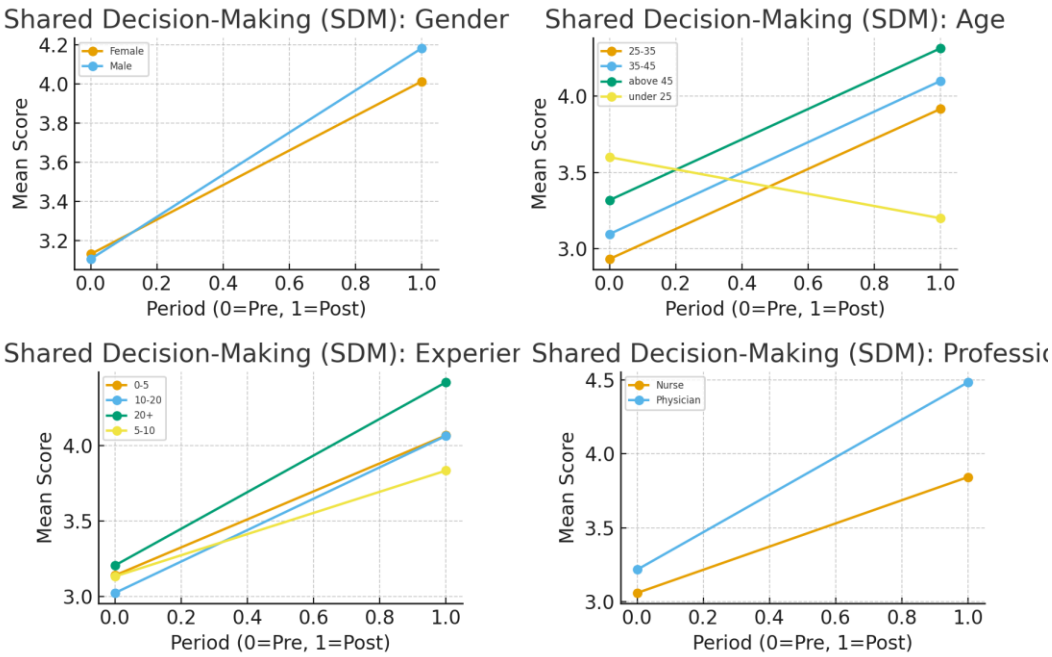

Figure 6. Shared Decision-Making (SDM) by Subgroups and Periods

Cultural Competence

Regression results for Cultural Competence are presented in Table D. The model explained a moderate amount of variance in cultural competence scores (R^2 = .39, Adjusted R^2 = .26, N = 100). The main effect of Period was not statistically significant (B = -0.28, SE = 0.46, t = -0.61, p = .540, β = -0.21), indicating that cultural competence scores did not significantly change following the intervention for the reference group (female, aged 25–35, 0–5 years of experience, nurses).

Among the demographic and professional predictors, profession showed a significant effect. Physicians reported lower cultural competence scores compared to nurses (B = -0.52, SE = 0.24, t = -2.14, p = .033, β = -0.37). No other demographic or experiential predictors were significant (ps > .26), and none of the interaction terms with Period reached significance. Grafically changes of the intervention are shown in Figure D. Overall, cultural competence did not significantly improve following the intervention, although differences were observed by profession, with physicians reporting lower scores than nurses across both periods.

Table 7. Regression Predicting Cultural Competence

Predictor	B	β	SE	t	p
Intercept	2.93	0.00	0.39	7.59	0.000
Period (Post vs. Pre)	-0.28	-0.21	0.46	-0.61	0.540
Age [35-45]	0.02	0.01	0.27	0.06	0.955
Age [above 45]	0.42	0.28	0.44	0.97	0.332
Age [under 25]	0.02	0.00	6.01	0.00	0.997
Gender [Male]	0.05	0.04	0.21	0.25	0.806
Experience [10-20]	-0.39	-0.26	0.42	-0.93	0.352
Experience [20+]	-0.52	-0.32	0.58	-0.90	0.369
Experience [5-10]	-0.43	-0.28	0.39	-1.11	0.267
Profession [Physician]	-0.52	-0.37	0.24	-2.14	0.033
Age [35-45] × Period	-0.19	-0.11	0.44	-0.44	0.664
Age [above 45] × Period	-0.53	-0.27	0.57	-0.92	0.357
Age [under 25] × Period	0.48	0.07	6.93	0.07	0.944
Gender [Male] × Period	0.13	0.08	0.33	0.40	0.691
Experience [10-20] × Period	0.75	0.39	0.55	1.37	0.171
Experience [20+] × Period	0.77	0.35	0.66	1.17	0.243
Experience [5-10] × Period	0.58	0.27	0.50	1.15	0.250
Profession [Physician] × Period	0.32	0.19	0.36	0.90	0.367

Note. N = 100, $R^2 = 0.20$, Adjusted $R^2 = 0.04$. Reference categories: Age = 25-35; Gender = Female; Experience = 0-5; Profession = Nurse. B = unstandardized coefficients; β = standardized coefficients; SE = standard error. Period coded as 0 = Pre, 1 = Post; interaction terms indicate differential changes relative to the reference profile.

Grafically changes of the intervention are shown in Figure 7. Overall, cultural competence did not significantly improve following the intervention, although differences were observed by profession, with physicians reporting lower scores than nurses across both periods.

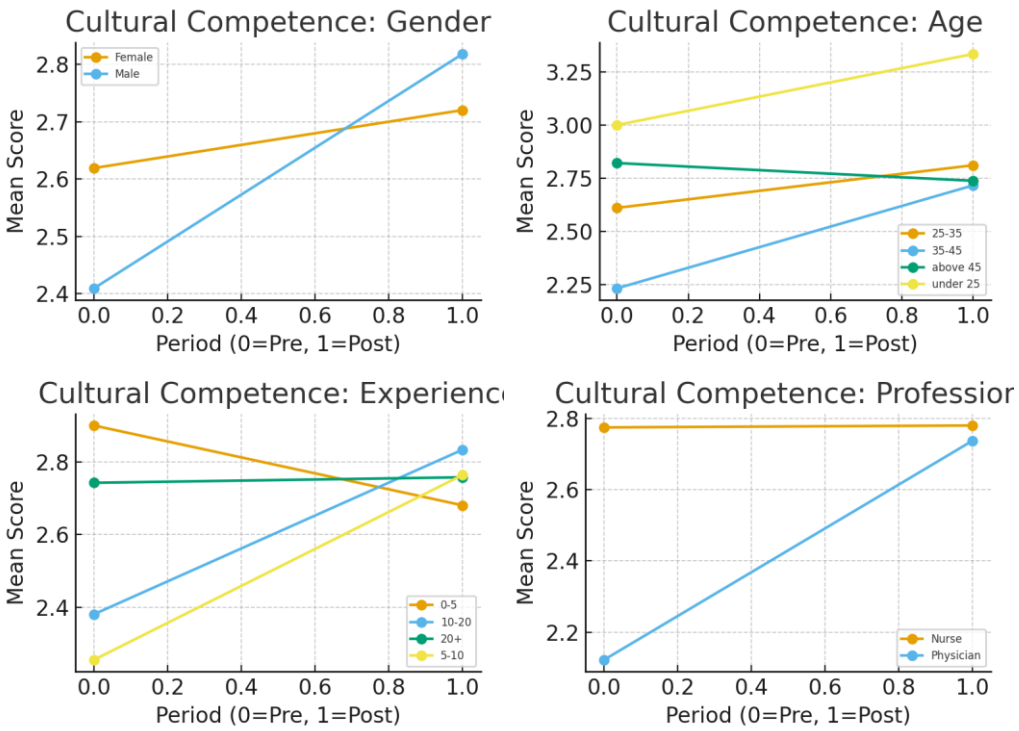

Figure 7. Cultural Competence by Subgroups and Periods

The regression analyses indicated that the intervention produced significant improvements in two of the four examined constructs. Empathy scores increased from pre- to post-intervention with a moderate effect size, and this pattern was consistent across all demographic and professional subgroups. Shared decision-making also improved significantly following the intervention, with participants reporting higher levels of engagement in collaborative care. The absence of significant interaction effects suggests that these improvements were broadly stable across age, gender, years of experience, and professional categories.

The models predicting trust did not identify a significant effect of the intervention. Instead, age emerged as an important predictor, with participants aged over forty-five reporting higher trust scores compared to the reference group aged twenty-five to thirty-five. This finding points to the possibility that trust is more closely associated with accumulated professional and personal experience than with short-term programmatic influences.

The models predicting cultural competence similarly did not show significant gains attributable to the intervention. Professional role, however, was a significant determinant. Physicians reported lower cultural competence scores compared to nurses across both measurement periods. This finding highlights the potential influence of professional expectations and clinical responsibilities on the development and expression of cultural competence.

DISSCUSION

This chapter presents an integrated interpretation of the empirical findings in relation to the study's objectives and their theoretical, practical, and policy implications for Israel's healthcare system. The results indicate that a structured, skills-based training program—focused on expectation-enhancing verbal communication, empathy, trust-supportive behaviors, shared decision-making (SDM), and culturally responsive care—was effective in promoting measurable short-term improvements in clinicians' reported communication practices. Participants described more frequent use of transparent rationale giving, clearer option presentation with explicit preference elicitation, and greater sensitivity to cultural–linguistic alignment during clinical encounters. Gender-based differences were minimal, while modest profession-specific variations reflected role expectations: physicians tended to lead SDM discussions, whereas nurses emphasized patient education and cultural mediation. These convergent improvements across empathic attunement, credible positive framing, and participatory deliberation suggest that the curriculum was accessible across professions and capable of influencing proximal determinants of patient experience in high-demand clinical environments such as emergency and orthopedic departments (Engel, 1977; Epstein & Street, 2011).

The multivariable, baseline-adjusted regression analyses refine this descriptive pattern by identifying the communication micro-skills most amenable to change. After adjustment for demographic and professional variables, empathy and SDM demonstrated statistically significant gains between the pre- and post-intervention assessments, confirming that these domains are responsive to short-term, focused training ($B = 0.84$, $p = .031$; $B = 1.11$, $p = .018$, respectively). Observed improvements align with evidence that targeted micro-skill training can enhance relational communication and near-term patient experience (Riess, 2017; Beach et al., 2021).

In contrast, trust and cultural competence exhibited positive but non-significant changes, with trust higher among older clinicians and cultural competence lower among physicians than nurses. This pattern is consistent with scholarship showing that trust develops cumulatively through repeated credible interactions and continuity, while cultural responsiveness grows through reflective practice and structural supports such as interpreter access and culturally adapted materials (Kelley & Riess, 2022; Tervalon & Murray-García, 1998; Foronda, 2020). The absence of significant interaction effects between period and subgroup variables suggests broadly uniform responsiveness across demographic and professional groups. Together, these empirical results delineate two developmental trajectories: rapidly trainable micro-skills

(empathy, SDM) and slower-moving relational capacities (trust, cultural competence) that require sustained practice, feedback, and institutional scaffolding to consolidate over time.

A critical appraisal clarifies the boundaries of inference and links methodological constraints to the study's objectives. First, reliance on self-reported measures introduces social desirability and common-method variance; the constructs targeted by training were also self-evaluated, which may inflate perceived gains. This limitation directly bears on Objective 1 (valid baseline characterization) and Objective 2 (estimation of change), underscoring the need to triangulate with patient-reported experience measures (PREMs) and blinded behavioral coding (Epstein & Street, 2011). Second, potential workshop-related biases—Hawthorne reactivity, facilitator allegiance, and transient group-norm effects—may contribute to immediate post-training improvements, cautioning that the significant period coefficients for empathy and SDM are best read as proximal rather than durable shifts; this relates to Objective 2 and motivates stepped-wedge or randomized designs with delayed follow-ups (Riess, 2017). Third, the short follow-up window limits conclusions regarding retention, decay, and dose–response, especially for trust and cultural competence, which are theorized to evolve through longitudinal exposure and context embedding (Tervalon & Murray-García, 1998; Foronda, 2020). Despite these constraints, the absence of significant Period×subgroup interactions advances Objective 3 by indicating broadly role-agnostic responsiveness, while the descriptive mapping of barriers (time pressure, workload, ambiguity around ethical verbal placebo) and facilitators (checklists, simulation, peer coaching) addresses Objective 4 by identifying operational levers for improvement.

Distinguishing measured outcomes from conceptual and system-level implications is essential. Empirically, the study quantified short-term, statistically significant gains in empathy and SDM and non-significant shifts in trust and cultural competence. Conceptually, the findings demonstrate how micro-skills can operationalize patient-centered and biopsychosocial care, with empathic attunement and participatory deliberation acting as proximal mechanisms that plausibly enhance adherence, satisfaction, and expectation-mediated analgesia when delivered transparently and without deception (Engel, 1977; Epstein & Street, 2011). Systemically, sustained improvement in trust and cultural responsiveness is unlikely without organizational design—reliable interpreter workflows, bilingual materials, culturally adapted consent processes, and protected time for reflection and coaching—thus translating Objective 5 into a multi-level implementation agenda for teams and institutions in Israel (Tervalon & Murray-García, 1998; Foronda, 2020).

Generalizability should be interpreted contextually. The sample was drawn from

acute-care Israeli services characterized by high throughput, limited consultation time, and frequent multilingual encounters. Accordingly, the findings generalize most directly to hospital settings with similar constraints and language diversity; extrapolation to primary care, community rehabilitation, or long-term follow-up clinics should proceed via adaptation rather than transplantation, calibrating to local interpreter availability, appointment length, staffing mix, and the cultural-linguistic composition of patient panels (Hebrew, Arabic, Russian, Amharic). Even with these caveats, the mechanisms identified—empathic attunement, transparent rationale giving, and participatory deliberation—are theoretically transferable, provided that implementation attends to sociocultural and organizational infrastructure unique to Israel's health system.

In conclusion, the study achieved its empirical aims by demonstrating significant short-term gains in empathy and SDM while clarifying the slower trajectory of trust and cultural competence. These results support a pragmatic view of communication as a therapeutic agent that can be intentionally trained and institutionally supported to improve clinical relationships and patient experience. At the same time, limitations of self-report, potential workshop biases, and brief follow-up constrain causal interpretation and justify a next generation of randomized or stepped-wedge, multi-site studies that incorporate behavioral observation, PREMs, and longer retention intervals. Within these parameters, structured micro-skill training appears to be a viable strategy for operationalizing biopsychosocial and patient-centered care in Israel's multilingual and multicultural clinical contexts (Engel, 1977; Epstein & Street, 2011; Riess, 2017; Beach et al., 2021; Kelley & Riess, 2022; Tervalon & Murray-García, 1998; Foronda, 2020).

Study Limitations

While the findings offer credible indications that a structured educational program can shift clinicians' interpersonal skills, several limitations temper inference and delineate priorities for future work. By design, this was a pre–post, single-arm study; without a concurrent control or counterfactual (e.g., randomized or stepped-wedge comparison), causal attribution is constrained. Secular trends, concurrent quality initiatives, staff turnover, or exposure to other trainings could contribute to observed change, as could regression to the mean. The timing of measurement immediately after workshops is particularly vulnerable to Hawthorne effects, facilitator allegiance, and transient norm conformity, which can inflate short-run prosocial responding. Follow-up was relatively brief, precluding conclusions about retention, decay, or dose–response; durable consolidation of relational micro-skills typically requires spaced practice, feedback, and coaching that were not systematically delivered or tracked here.

All primary outcomes were clinician self-reports of empathy, communication, trust-supportive behaviors, shared decision-making (SDM), and cultural competence. Although the instruments were standardized, self-report is susceptible to social desirability, recall error, and common-method variance, and can overstate enacted behavior at the bedside. Because the study was conducted among clinicians rather than patients, there is no direct evidence that reported gains translated into patient-level outcomes (pain intensity, function, adherence, satisfaction) or into equity impacts across language and cultural subgroups. Fidelity to target micro-skills under routine conditions (e.g., transparent rationale-giving, option-talk with preference elicitation, culturally adapted explanations) was not independently audited through blinded observation or encounter coding, and electronic health record traces were not leveraged to triangulate behavior change. Measurement limitations also include possible ceiling effects (particularly among highly motivated volunteers), overlap among mediators (empathy, trust, SDM, cultural responsiveness) that may inflate multicollinearity and attenuate unique effects, and untested measurement invariance across professional roles or language groups.

Sampling and context further constrain external validity. Participants were recruited from a limited number of Israeli institutions—largely acute-care environments—using convenience methods; thus, results are most applicable to high-throughput services with multilingual encounters and may not generalize to primary care, rehabilitation, or community clinics. Interpreter access, staffing ratios, appointment length, and local culture vary meaningfully across settings and could condition both feasibility and impact. While both physicians and nurses participated and gender differences were minimal, other sources of heterogeneity (seniority, specialty, prior communication

training, workload) were not deeply modeled. Power to detect small interactions (e.g., Profession×Period, Sociocultural moderators) may have been insufficient, raising the risk of Type II error; conversely, examining multiple related constructs increases the risk of Type I error despite theory-guided analyses. Missing-data mechanisms, if any, were not formally interrogated (e.g., sensitivity to Missing Not at Random), and trainer/setting effects were not explicitly modeled, limiting insight into implementation variability and potential contamination across units.

Finally, the multicomponent curriculum (expectation-enhancing communication, empathy, trust behaviors, SDM, cultural responsiveness) does not permit isolation of active ingredients. Without dismantling or factorial designs, one cannot determine which elements drove observed changes or whether particular sequences or "bundles" are necessary for effect. Ethical safeguards around expectation-enhancing messages—transparency, non-deception, respect for autonomy—were articulated conceptually but not audited in practice; absent monitoring, there is residual uncertainty about consistency with professional norms across diverse clinical scenarios. Together, these limitations argue for a next phase of research that employs randomized or stepped-wedge, multi-site designs; links clinician training to blinded behavioral coding and patient-reported experience measures as well as clinical endpoints; incorporates longer follow-up with booster dosing to test retention; uses multilevel models to capture patient-within-clinician-within-service dynamics; examines moderation by workload, interpreter infrastructure, and specialty; evaluates fidelity and contamination; and, if feasible, uses factorial/dismantling approaches to identify the most potent and scalable training components.

Recommendations for Practice and Future Research

Based on the study findings, several recommendations emerge for both clinical practice and future research. Healthcare institutions should prioritize structured educational programs that enhance empathy, communication, trust-building, and cultural competence among healthcare professionals. Implementing interprofessional training that integrates physicians, nurses, and other allied health staff can promote consistency in skills across roles, fostering improved teamwork and patient-centered care. The inclusion of experiential learning strategies, such as simulations, role-playing, and feedback sessions, is recommended to facilitate skill acquisition and real-world application.

For future research, studies should consider more rigorous designs, including randomized controlled trials, to establish causality more definitively. Longitudinal studies are needed to evaluate the persistence of improved interpersonal skills over time and their impact on patient outcomes. Researchers should also explore objective and observational assessments alongside self-report measures to provide a more comprehensive understanding of the intervention's effectiveness.

Moreover, examining the influence of contextual factors such as organizational culture, workload, and systemic pressures on the sustainability of interpersonal skill improvements is important. Tailoring interventions to account for these factors may enhance their effectiveness. Finally, exploring individual differences, including professional experience, prior communication training, and demographic characteristics, can inform the development of more personalized and targeted educational programs while maintaining broad applicability.

Overall, these recommendations aim to support the translation of structured interpersonal skills training into clinical practice, enhancing healthcare professionals' ability to provide empathetic, effective, and culturally competent care.

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