



Knowledge, Attitude and Practice of the Bio psychosocial Model in Chronic Musculoskeletal Pain Management among Physiotherapists

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ABSTRACT

Background: Chronic musculoskeletal pain (CMP) is a significant global health concern, impacting quality of life and increasing healthcare costs. While the traditional biomedical model (BMM) focuses on biological factors, the biopsychosocial model (BPSM) integrates biological, psychological, and social components to offer a more holistic approach. Despite its effectiveness, the adoption of the BPSM in clinical physiotherapy practice remains inconsistent.

Objective: This study aims to assess the knowledge, attitudes, and practices (KAP) of Indian physiotherapists regarding the BPSM in managing CMP, identifying barriers and facilitators to its implementation.

Methods: A cross-sectional, quantitative survey was conducted among 116 physiotherapists in India using an online questionnaire. The survey included Likert-scale questions assessing knowledge, attitudes, and practices related to the BPSM. Data were analysed using descriptive and inferential statistics.

Results: Participants demonstrated a strong theoretical understanding of the BPSM, with high awareness of its principles and differentiation from the BMM. Attitudinal responses indicated a positive inclination toward adopting the BPSM, with a willingness to receive additional training and collaborate with other healthcare professionals. However, practical application varied, with key barriers including time constraints, patient non-compliance, and limited resources. The persistence of biomedical-based assessments and treatments suggests that full integration of the BPSM into physiotherapy practice is still evolving.

Conclusions: While Indian physiotherapists recognize the importance of the BPSM in pain management, practical challenges hinder its full implementation. Addressing these barriers through structured education, interdisciplinary collaboration, and system-level changes could enhance the adoption of the BPSM in clinical practice. Future research should explore the impact of targeted interventions on improving BPS-based patient care.

Keywords: Biopsychosocial Model, Chronic Musculoskeletal Pain, Knowledge-Attitude-Practice, Biomedical Model, Interdisciplinary collaboration, Patient centered care, Rehabilitation.

INTRODUCTION

Chronic musculoskeletal conditions (CMC) represent a significant global health challenge, affecting millions of individuals and contributing to long-term disability, diminished quality of life, and substantial economic burdens for individuals and society alike (1). Chronic musculoskeletal pain (CMP), a core component of CMCs, has been particularly problematic due to its persistent nature and the escalating healthcare costs associated with its management (2). Traditionally, the biomedical model (BMM), which emphasizes anatomical and physiological causes of disease, has dominated the management of CMP. While this model has its merits, its narrow focus often neglects the psychological and social dimensions of pain, leading to fragmented care and suboptimal patient outcomes (3).

In contrast, the biopsychosocial model (BPSM), proposed by George Engel in 1977, offers a more comprehensive framework for understanding health and illness by integrating biological, psychological, and social domains (4). Although the BPSM provides a holistic understanding of patient experience, its implementation in clinical settings has been met with skepticism. Some critics argue that the model is too complex or idealistic for practical use, especially when applied at the level of individual patient care (5). Despite this, the BPSM remains a cornerstone in modern pain science and is considered a more humane and scientifically grounded approach to healthcare delivery.

According to the BPS model, pain is not merely a sensory experience but a complex phenomenon shaped by biological mechanisms and influenced by psychological states and social environments (6,7). Contemporary research highlights the utility of this model in chronic pain management, particularly its ability to inform personalized assessment, prevention, and intervention strategies (8,9). The model has been adapted to suit different stakeholders—

patients, clinicians, and trainees—to foster a better understanding of its components and promote collaborative decision-making (9). Its adoption is increasingly seen as essential for delivering effective and sustainable care in musculoskeletal medicine.

The BPSM has inspired the development of psychosocial interventions that target cognitive and emotional factors contributing to chronic pain (10,11). These strategies aim to improve not only pain outcomes but also the overall quality of life of individuals with chronic conditions. In musculoskeletal care, the model enhances the precision of treatment by aligning interventions with the unique biopsychosocial profiles of patients (12). However, while the theoretical support for the BPSM is robust, practical implementation remains uneven, particularly in fields like physiotherapy, where training and systemic support may be lacking (13).

One of the key barriers to implementation lies in the model's lack of conceptual clarity and limited translation into actionable clinical frameworks (13,14). Physiotherapists, especially those in primary care settings, often face challenges in applying the BPSM due to insufficient training, time constraints, and resistance from both practitioners and patients to shift from the traditional biomedical paradigm. Understanding these barriers and identifying facilitators is essential for creating meaningful change. Scoping reviews and other recent studies have begun to map these factors, offering valuable insights into how the BPSM can be more effectively integrated into routine practice (15,16).

The biopsychosocial model aids primary care physicians in understanding the complex interplay between biological, psychological, and social factors contributing to illness. This comprehensive perspective not only enhances the clinician–patient relationship but also supports the integration of multidisciplinary strategies in patient care. Embracing this model in chronic pain management fosters patient empowerment and promotes collaborative care, ultimately leading to improved clinical outcomes. Increasingly, there is growing recognition of how psychological and psychosocial elements—such as self-efficacy, fear-avoidance beliefs, and emotional well-being—significantly influence rehabilitation outcomes in musculoskeletal medicine. (17-19)

Hence, this study aims to assess physiotherapists' understanding and application of the BPS model in managing chronic musculoskeletal pain, with a focus on identifying key barriers and enablers to its clinical implementation. Additionally, it seeks to explore practitioners' readiness to adopt an interdisciplinary approach that encompasses psychological and social considerations alongside physical care. The study is particularly relevant in the Indian context, where musculoskeletal disorders are highly prevalent and care often remains rooted in the biomedical tradition. By evaluating knowledge, attitudes, and practices, this study contributes to both national and global discussions on patient-centered care and helps inform educational, policy, and clinical strategies to support a more holistic and effective approach to chronic pain management.

Material and Methods

Participants

The study included 116 licensed physiotherapists practicing in India, selected using a snowball sampling method. Inclusion criteria required participants to hold a Bachelor's, Master's, or Doctoral degree in Physiotherapy, have a minimum of two years of clinical experience in musculoskeletal rehabilitation, and be actively practicing in clinical or academic settings. Participants had to consent to take part in the study. Exclusion criteria included physiotherapists with less than two years of experience, those not practicing in musculoskeletal settings, physiotherapists practicing outside India, and those who provided incomplete responses.

Study Design

A cross-sectional, quantitative online survey design was employed to evaluate the knowledge, attitudes, and practices (KAP) of physiotherapists regarding the Biopsychosocial (BPS) model in chronic musculoskeletal pain (CMSP) management. This design facilitated data collection from a geographically diverse population and allowed for the assessment of current clinical behaviors and perspectives.

Procedure

Ethical approval was obtained from the Institutional Ethics and Scientific Committee of SCOP. A self-developed, structured questionnaire was distributed via social media platforms and professional networks. The survey consisted of Likert-scale items focused on three domains: knowledge, attitudes, and practices related to the BPS model. Prior to distribution, the tool was validated by an expert panel and pilot tested for clarity and reliability. Participants provided informed consent electronically and completed the questionnaire through Google Forms. Data collection was conducted over a two-month period between October and December 2024.

Data Analysis

Data were analyzed using SPSS software. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographic data and responses related to knowledge, attitude, and practice. Inferential statistics, including correlation analysis, were conducted to examine relationships between knowledge, attitude, and practice scores.

Results

A total of 116 participants were included in the study, with a higher representation of females (69.8%) compared to males (30.2%). The majority of participants (84.5%) were from Gujarat, while the remaining were from other states. In terms of educational qualifications, most held a Bachelor of Physiotherapy (BPT) degree (60.3%), and the rest had a Master of Physiotherapy (MPT) degree (39.7%).

Regarding professional settings, over half of the participants (53.4%) were engaged in private clinical practice, followed by those working in hospitals (25.9%) and academic institutions (20.7%), suggesting that private clinical setups were the predominant work environment.

The average age of participants was 30.83 years, with a standard deviation of 7.93, and an age range spanning from 22 to 53 years. Experience in the field varied widely, with an average of 7.78 years, a standard deviation of 6.82, and a range from 1.5 to 28 years. This indicates substantial diversity in clinical experience among the respondents (Table 1).

Table 1: Demographic characteristics of participants

SUBJECT CHARACTERISTIC	FREQUENCY	PERCENTAGE
GENDER		
Female	81	69.8%
Male	35	30.2%
REGION / STATE		
Gujarat	98	84.5%
Outside Gujarat	18	15.5%
QUALIFICATION		
BPT	70	60.3%
MPT	46	39.7%
CLINICAL PRACTICE		
Clinical set up	62	53.4%
Hospital set up	30	25.9%
Academic set up	24	20.7%

The study assessed knowledge of the biopsychosocial (BPS) model of pain management using multiple statements. Participants reported the highest familiarity with differentiating biological and social factors influencing pain (Mean = 4.18, SD = 0.753) and understanding the role of cognitive-behavioural therapy (CBT) in pain management (Mean = 3.99, SD = 0.870). Awareness of the latest guidelines recommending the BPS model scored the lowest (Mean = 3.18, SD = 1.167). Across all items, the median and mode were consistently 4.00, suggesting a general agreement on knowledge. Standard deviations ranged from 0.753 to 1.167, indicating varying degrees of response dispersion. The interquartile range (IQR) was mostly 1.00, except for awareness of the BPS model and its guidelines (IQR = 2.00). The range was consistently 4, showing diversity in responses. These results suggest that while respondents have a strong theoretical understanding of the BPS model, gaps exist in awareness of guidelines and practical applications. (Figure1)

The study evaluated attitudes toward the biopsychosocial (BPS) model of pain management, revealing strong agreement on its importance. Participants highly endorsed the belief that psychological and social factors are as crucial as biological ones (Mean = 4.28, SD = 0.822) and showed a willingness to collaborate with other healthcare professionals (Mean = 4.28, SD = 0.720). Interest in further training (Mean = 4.23, SD = 0.702) and motivation to adopt the BPS model (Mean = 4.07, SD = 0.777) were also notable. Confidence in implementing the model (Mean = 3.72, SD = 0.819) and perceived barriers, such as lack of time (Mean = 3.74, SD = 0.915) and patient compliance (Mean = 3.73, SD = 0.911), showed moderate agreement. While many acknowledged that the biomedical approach could lead to overtreatment (Mean = 3.43, SD = 1.057), they also recognized the benefits of integrating both models (Mean = 4.12, SD = 0.700). The findings suggest a positive attitude toward the BPS model but highlight challenges in practical implementation. (Figure2)

The study examined the practical implementation of the biopsychosocial (BPS) model in pain management, highlighting both strengths and challenges. Participants reported high engagement in educating patients about the influence of stress and emotions on pain (Mean = 4.21, SD = 0.808) and incorporating goal-setting activities that address psychological and social aspects (Mean = 4.01, SD = 0.839). Social determinants of health and patient-reported outcome measures were also commonly considered in treatment planning (Mean = 3.84, SD = 0.776 and 0.884, respectively). However, challenges remain, as limited resources in primary care were noted as a barrier to addressing psychological factors (Mean = 3.75, SD = 0.893). While many clinicians actively seek continuing education on BPS-based pain management (Mean = 3.89, SD = 0.842), reliance on physical examinations (Mean = 3.78, SD = 0.914) and imaging studies (Mean = 3.31, SD = 1.033) suggests a persisting biomedical approach. Prescribing exercises and manual therapy remained a primary treatment method (Mean = 3.95, SD = 0.893). These findings indicate a growing integration of the BPS model in practice, yet emphasize the need for further training and resource allocation to fully implement a holistic pain management approach. (Figure3)

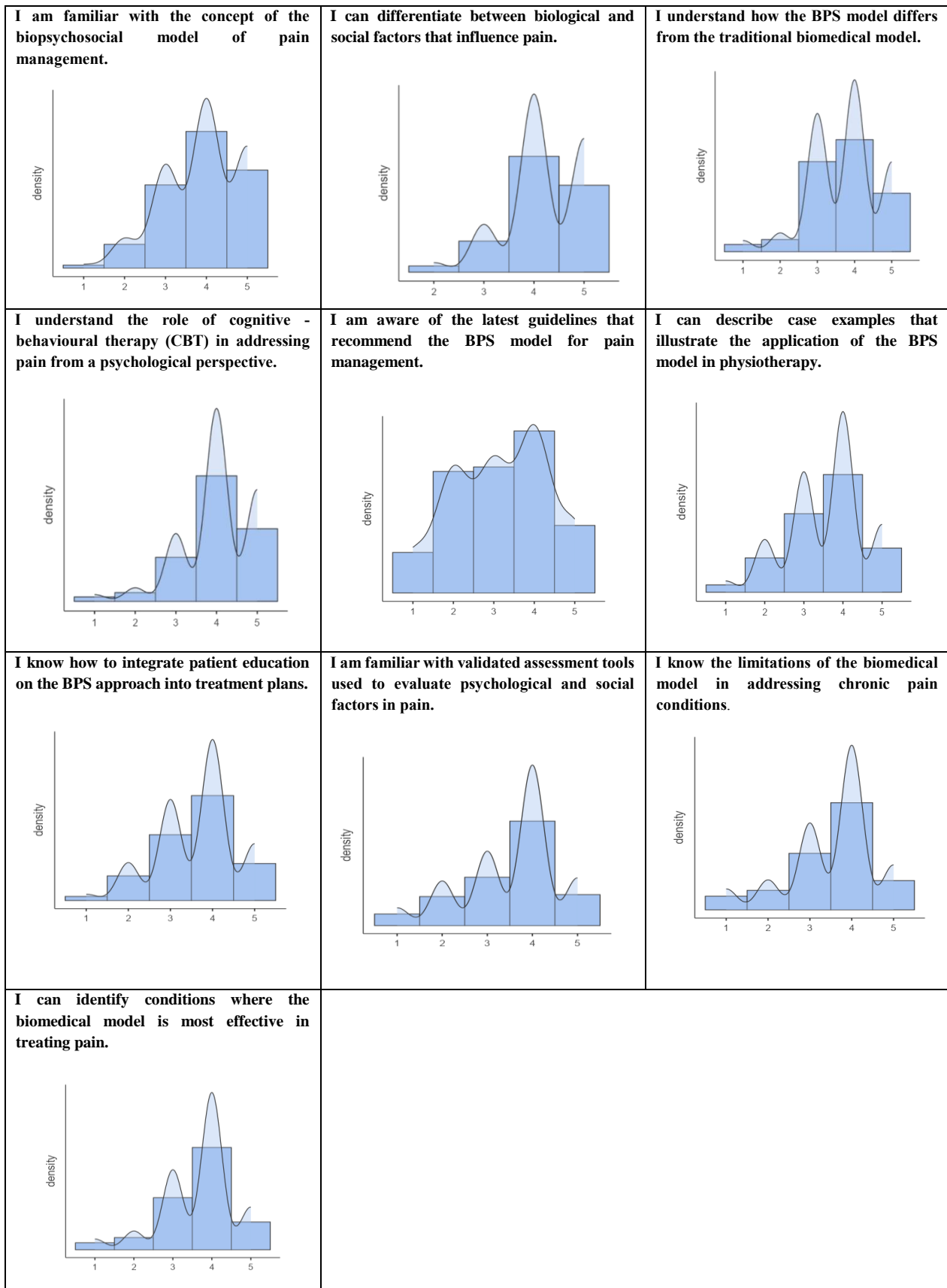


Figure 1: Knowledge regarding BPS Model of participants

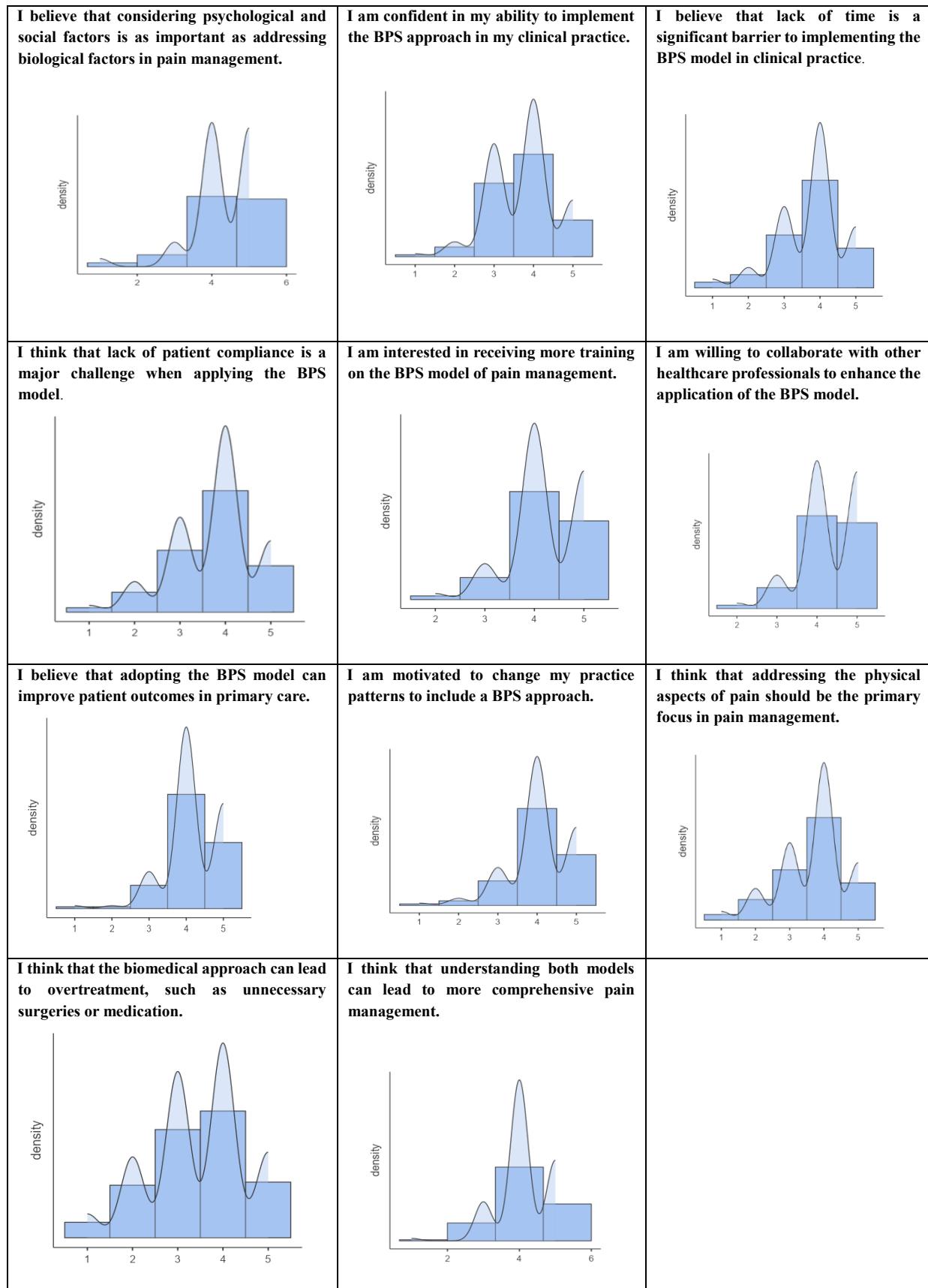


Figure 2: Attitude regarding BPS Model of participants

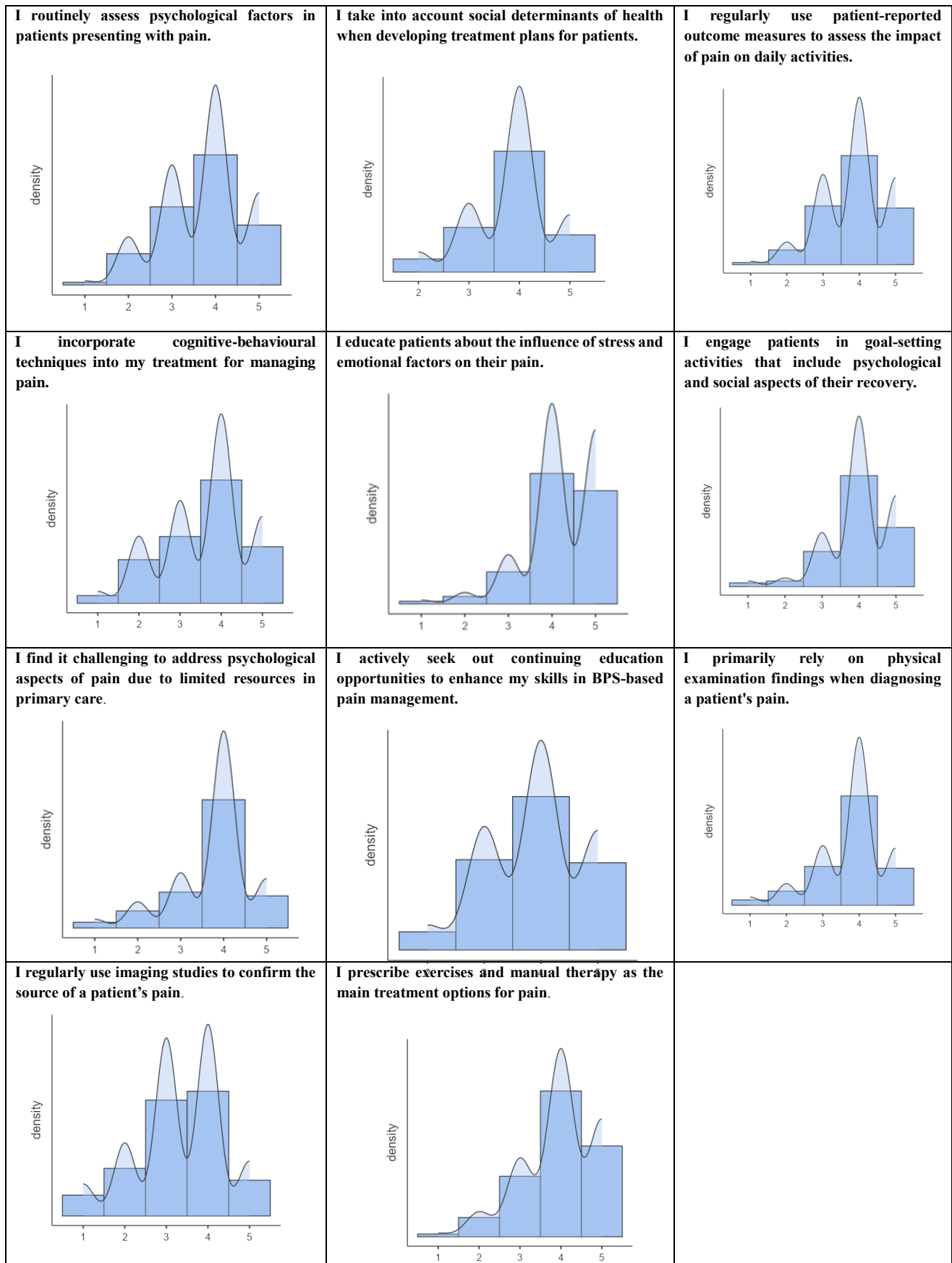


Figure 3: Practice regarding BPS Model of participants

Pearson's correlation analysis revealed no significant relationship between knowledge and variables such as age, gender, qualification, or clinical practice. However, age showed a strong positive association with both gender and qualification, indicating that older participants were more likely to have higher

qualifications and a specific gender distribution. Clinical practice was weakly but significantly associated with both qualification and age, suggesting that individuals with higher qualifications and greater age tended to have more clinical experience. There was no significant relationship between clinical practice and gender. (Figure 4)

Similarly, no significant relationship was found between attitude and age, gender, qualification, or clinical practice. As with the knowledge domain, age continued to show a strong positive association with gender and qualification, and clinical practice showed weak but significant associations with age and qualification. No significant link was found between clinical practice and gender. (Figure5)

For the practice domain, there was no significant association with age, gender, qualification, or clinical practice. However, age again demonstrated significant correlations with both gender and qualification. Clinical practice showed weak but significant associations with age and qualification, while its relationship with gender was not significant. (Figure 6)

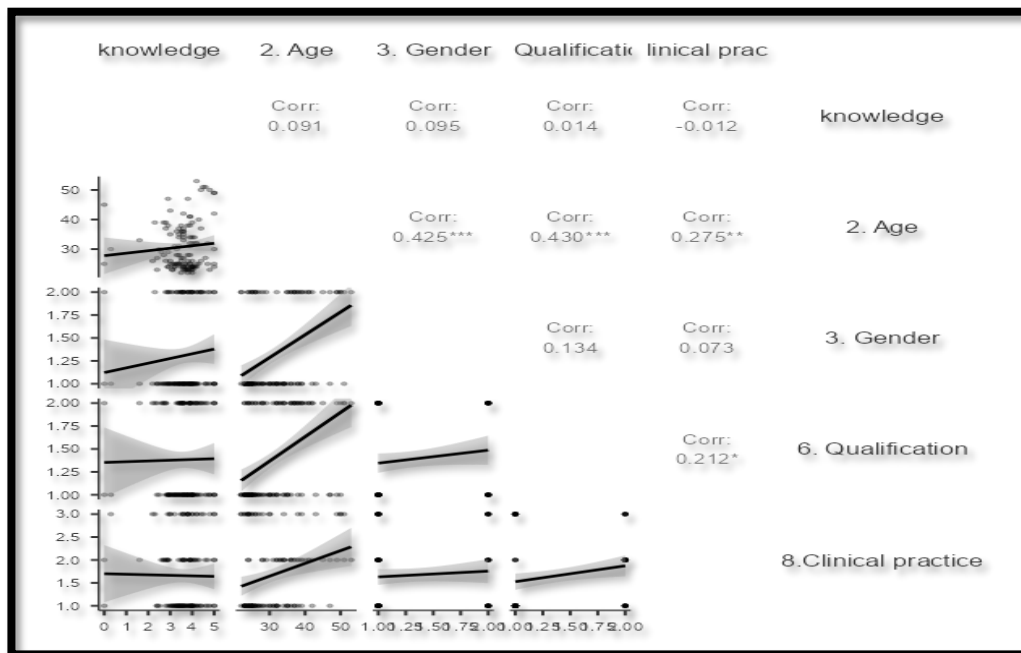


Figure 4: Correlation between Knowledge and demographic variables

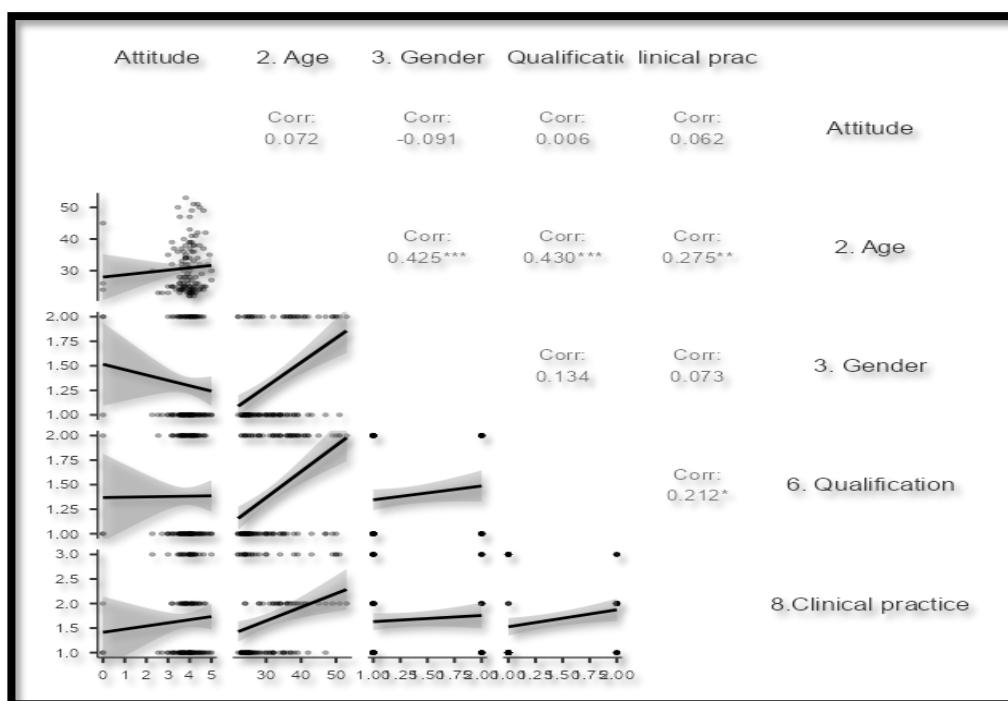


Figure 5: Correlation between Attitude and demographic variables

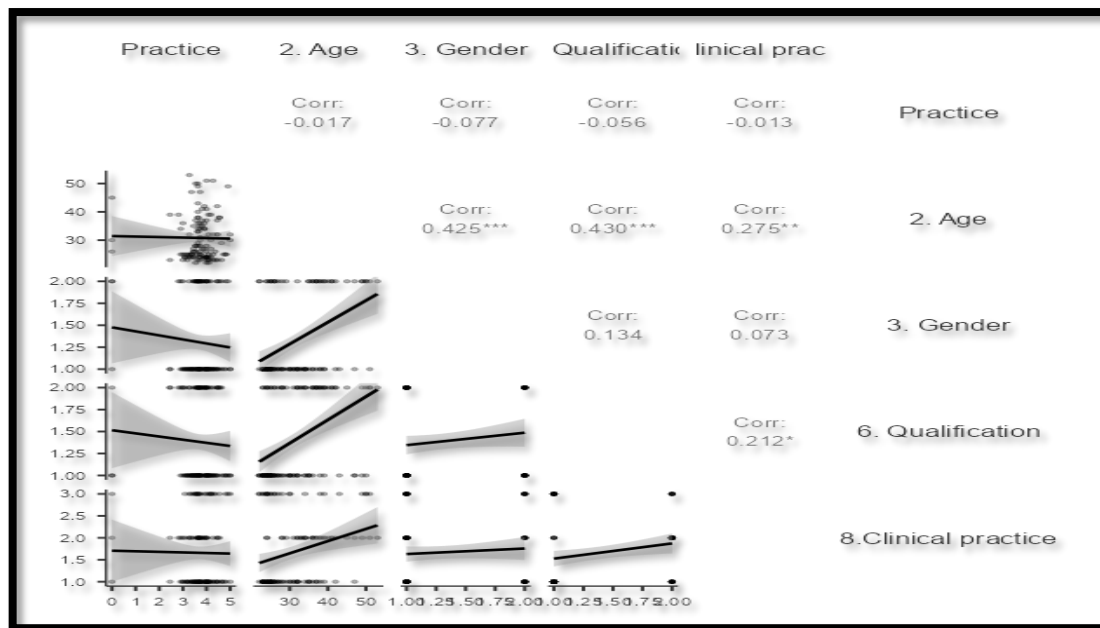


Figure 6: Correlation between Practice and demographic variables

Univariate analysis showed no significant main effects of gender, clinical practice, qualification, or age on knowledge, attitude, or practice, indicating that these individual factors did not independently influence the outcomes. However, a significant interaction was observed between gender and clinical practice for the practice domain, suggesting that the combination of these two factors may influence practice behaviors. Other interaction effects, including gender with qualification, clinical practice with qualification, and the three-way interaction among gender, clinical practice, and qualification, were not statistically significant. Across all models, a considerable amount of residual variance remained, indicating that other unmeasured factors may be contributing to variations in the outcomes.

DISCUSSION

This study highlights a growing recognition of the biopsychosocial (BPS) model in pain management among healthcare professionals. Participants demonstrated a solid theoretical understanding of the BPS approach and expressed strong agreement regarding its relevance in clinical practice. The interrelationships among Knowledge, Attitude, and Practice (KAP) offer meaningful insights into how these elements interact and support each other. Attitude showed the strongest association with Practice, suggesting that positive beliefs about the BPS model are a key driver of its application in clinical settings. While Knowledge also had moderate associations with both Attitude and Practice, it appears that information alone is not enough to ensure implementation without a supportive mindset.

Demographic and professional variables such as age, gender, qualification, and clinical experience did not show significant individual effects on KAP outcomes. Although age correlated with gender and qualification, these relationships did not influence knowledge, attitudes, or practices regarding the BPS model. This finding suggests that effective professional behavior is more likely shaped by contextual or experiential factors—such as ongoing training, exposure to real-world clinical complexity, and workplace culture—rather than static demographic characteristics. The results underscore the importance of addressing environmental and institutional elements to foster better BPS model integration.

An interesting exception was the interaction effect observed between gender and clinical experience on Practice. This suggests that while individual demographic factors may not influence practice alone, their combination can have meaningful implications. It highlights the complex and nuanced ways in which personal and professional characteristics intersect to shape clinician behavior. This finding reinforces the value of multifactorial analysis in future research, emphasizing the need to consider the broader interplay of variables rather than isolated effects.

Despite clinicians acknowledging the significance of psychological and social dimensions alongside biological ones, there remains a noticeable gap between understanding and implementation. Barriers such as limited time, inadequate resources, and challenges in patient compliance were commonly reported. These obstacles mirror those found in earlier studies and highlight ongoing difficulties in adopting a BPS approach, especially in environments still dominated by biomedical frameworks. The persistent use of structural diagnostic tools, such as imaging and physical assessments, also suggests that many practitioners still prioritize physical over psychosocial evaluation. (20–25).

This study also brings attention to systemic challenges in translating theoretical models into practice. While the participants expressed openness to further training and interdisciplinary collaboration, such intentions must be supported by structural and institutional changes. Developing BPS-oriented interventions, embedding them into continuing professional education, and promoting policies that allow for longer consultations and interprofessional

teamwork could significantly improve the uptake of BPS principles. Existing evidence supports the effectiveness of BPS education in improving attitudes, knowledge, and even clinical behavior, though more data are needed on its influence on patient outcomes (26-28).

Several limitations of the study should be acknowledged. The cross-sectional design limits the ability to observe changes in knowledge, attitude, and practice over time, preventing any causal interpretations. The use of self-reported data may introduce response bias, as participants could overestimate their familiarity with or application of the biopsychosocial (BPS) model. Additionally, the exclusion of early-career professionals may have led to the omission of perspectives from those in the early stages of clinical practice, potentially narrowing the scope of insights. Future research should consider longitudinal designs to track changes over time and include a more diverse and representative sample, incorporating varying levels of clinical experience. Evaluating patient-centered outcomes and investigating the effects of structured BPS-based interventions will be essential for understanding the long-term value and clinical impact of this model in musculoskeletal care.

Conclusions

This study underscores the growing awareness and positive attitudes among healthcare professionals regarding the biopsychosocial (BPS) model of pain management. While participants demonstrated a strong theoretical understanding and recognition of the model's importance, there were notable gaps in practical application. Factors such as limited time, resource constraints, and patient compliance challenges were identified as key barriers to integrating BPS principles into clinical practice. These findings align with existing literature suggesting that while the transition from a biomedical to a BPS approach is widely advocated, systemic and institutional factors continue to hinder its full adoption.

Despite these challenges, the results indicate an increasing willingness among healthcare providers to engage in further training and collaboration to enhance BPS-based pain management. The study highlights the need for targeted educational programs and policy changes that support a more holistic approach to patient care. Addressing these barriers through structured training, interdisciplinary teamwork, and modifications in clinical workflow could significantly improve the integration of BPS principles into routine practice. Future studies should explore whether these interventions lead to measurable improvements in both clinician behavior and patient outcomes.

In conclusion, while the BPS model is gaining traction in pain management, practical implementation remains a challenge. Bridging the gap between knowledge and practice requires systemic efforts, including enhanced training opportunities, policy reforms, and increased interdisciplinary collaboration. By addressing these factors, healthcare institutions can foster a more patient-centered approach to pain management, ultimately improving patient care and long-term health outcomes.

Declarations

Ethics approval and consent to participate

The ethical approval was taken from the Institutional Ethics and Scientific Committee of SCOP (Ref: SMT/SCOP/PT/24-25/797).

Consent for publication

All the authors agreed to publish the paper in the IJPTRS journal

Availability of data and materials

N/A. No data set is associated with this submission.

Conflict of interest

The authors state that they have no competing interest to declare.

Declaration about the amount of funds required and its source

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References

1. Pomarensky M, Macedo L, Braithwaite S, Qamhawi Z, Briggs J, Little MW. Transcatheter embolisation in chronic musculoskeletal disorders. *Br J Radiol*. 2023 Sep;96(1149):20220728.
2. Carlesso LC. Management of Chronic Musculoskeletal Pain Through a Biopsychosocial Lens. *J Athl Train*. 2022 Apr 1;57(4):312–8.
3. Nuernberg Back CG, Liebano RE, Avila MA. Perspectives of implementing the biopsychosocial model to treat chronic musculoskeletal pain in primary health care. *Pain Manag*. 2021 Mar;11(2):217–25.
4. Bolton D. A revitalized biopsychosocial model: core theory, research paradigms, and clinical implications. *Psychol Med*. 2023 Dec;53(16):7504–11.
5. Kusnanto H, Agustian D, Hilmanto D. Biopsychosocial model of illnesses in primary care: A hermeneutic literature review. *J Family Med Prim Care*. 2018 May-Jun;7(3):497-500. doi: 10.4103/jfmpe.jfmpe_145_17. PMID: 30112296; PMCID: PMC6069638.

6. Meints SM, Edwards RR. Evaluating psychosocial contributions to chronic pain outcomes. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018 Dec 20;87(Pt B):168-182. doi: 10.1016/j.pnpbp.2018.01.017. Epub 2018 Jan 31. PMID: 29408484; PMCID: PMC6067990.
7. Keefe, F. J., & France, C. R. (1999). Pain: Biopsychosocial Mechanisms and Management. *Current Directions in Psychological Science*, 8(5), 137-141. <https://doi.org/10.1111/1467-8721.00032> (Original work published 1999)
8. Pomarensky M, Macedo L, Carlesso LC. Management of Chronic Musculoskeletal Pain Through a Biopsychosocial Lens. *J Athl Train*. 2022 Apr 1;57(4):312-318. doi: 10.4085/1062-6050-0521.20. PMID: 35439311; PMCID: PMC9020600.
9. Dong HJ, Bäckryd E. Teaching the biopsychosocial model of chronic pain: Whom are we talking to? *Patient Educ Couns*. 2023 May;110:107645. doi: 10.1016/j.pec.2023.107645. Epub 2023 Jan 23. PMID: 36736089.
10. Roberts A. The biopsychosocial model: Its use and abuse. *Med Health Care Philos*. 2023 Sep;26(3):367-384. doi: 10.1007/s11019-023-10150-2. Epub 2023 Apr 17. PMID: 37067677; PMCID: PMC10107555.
11. Meints SM, Edwards RR. Evaluating psychosocial contributions to chronic pain outcomes. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018 Dec 20;87(Pt B):168-182. doi: 10.1016/j.pnpbp.2018.01.017. Epub 2018 Jan 31. PMID: 29408484; PMCID: PMC6067990.
12. Hawker GA. The assessment of musculoskeletal pain. *Clin Exp Rheumatol*. 2017 Sep-Oct;35 Suppl 107(5):8-12. Epub 2017 Sep 28. PMID: 28967361.
13. Daluiso-King G, Hebron C. Is the biopsychosocial model in musculoskeletal physiotherapy adequate? An evolutionary concept analysis. *Physiother Theory Pract*. 2022 Mar;38(3):373-389. doi: 10.1080/09593985.2020.1765440. Epub 2020 Jun 16. PMID: 32546079.
14. Borrell-Carrió F, Suchman AL, Epstein RM. The biopsychosocial model 25 years later: principles, practice, and scientific inquiry. *Ann Fam Med*. 2004 Dec;2(6):576-82.
15. van Dijk H, Kôke AJA, Elbers S, Mollema J, Smeets RJEM, Wittink H. Physiotherapists Using the Biopsychosocial Model for Chronic Pain: Barriers and Facilitators-A Scoping Review. *Int J Environ Res Public Health*. 2023 Jan 16;20(2):1634. doi: 10.3390/ijerph20021634. PMID: 36674387; PMCID: PMC9861865.
16. Koukoulithras I, Plexousakis M, Kolokotsios S, Stamouli A, Mavrogiannopoulou C. A Biopsychosocial Model-Based Clinical Approach in Myofascial Pain Syndrome: A Narrative Review. *Cureus*. 2021 Apr 28;13(4):e14737. doi: 10.7759/cureus.14737. PMID: 33936911; PMCID: PMC8081263.
17. Kusnanto H, Agustian D, Hilmanto D. Biopsychosocial model of illnesses in primary care: A hermeneutic literature review. *J Family Med Prim Care*. 2018 May-Jun;7(3):497-500. doi: 10.4103/jfmpe.jfmpe_145_17. PMID: 30112296; PMCID: PMC6069638.
18. Meints SM, Edwards RR. Evaluating psychosocial contributions to chronic pain outcomes. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018 Dec 20;87(Pt B):168-182. doi: 10.1016/j.pnpbp.2018.01.017. Epub 2018 Jan 31. PMID: 29408484; PMCID: PMC6067990.
19. Edgar N, Clifford C, O'Neill S, Pedret C, Kirwan P, Millar NL. Biopsychosocial approach to tendinopathy. *BMJ Open Sport Exerc Med*. 2022 Aug 1;8(3):e001326. doi: 10.1136/bmjsem-2022-001326. PMID: 35990762; PMCID: PMC9345071.
20. Gervais-Hupé J, Filleul A, Perreault K, Hudon A. Implementation of a biopsychosocial approach into physiotherapists' practice: a review of systematic reviews to map barriers and facilitators and identify specific behavior change techniques. *Disabil Rehabil*. 2023 Jul;45(14):2263-2272. doi: 10.1080/09638288.2022.2094479. Epub 2022 Jul 5. PMID: 35790490.
21. Ng W, Slater H, Starcevic C, Wright A, Mitchell T, Beales D. Barriers and enablers influencing healthcare professionals' adoption of a biopsychosocial approach to musculoskeletal pain: a systematic review and qualitative evidence synthesis. *Pain*. 2021 Aug 1;162(8):2154-2185. doi: 10.1097/j.pain.0000000000002217. PMID: 33534357.
22. Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: Scientific advances and future directions. *Psychological Bulletin*, 133(4), 581.
23. Linton, S. J., & Shaw, W. S. (2011). Impact of psychological factors in the experience of pain. *Physical Therapy*, 91(5), 700-711.
24. Nicholas, M. K., & George, S. Z. (2011). Psychologically informed interventions for low back pain: An update for physical therapists. *Physical Therapy*, 91(5), 765-776.
25. Rossetini, G., Carlino, E., Testa, M., & Benedetti, F. (2018). Context matters: The biopsychosocial model of low back pain. *European Journal of Pain*, 22(8), 1454-1472.
26. Smart KM. The biopsychosocial model of pain in physiotherapy: past, present and future. *Phys Ther Rev [Internet]*. 2023 Mar 4;28(2):61-70. Available from: <https://doi.org/10.1080/10833196.2023.2177792>
27. Mankelow J, Ryan C, Taylor P, Atkinson G, Martin D. A Systematic Review and Meta-Analysis of the Effects of Biopsychosocial Pain Education upon Health Care Professional Pain Attitudes, Knowledge, Behavior and Patient Outcomes. *J Pain*. 2022 Jan;23(1):1-24. doi: 10.1016/j.jpain.2021.06.010. Epub 2021 Jul 6. PMID: 34237464.
28. Booth J, Moseley GL, Schiltenswolf M, Cashin A, Davies M, Hübscher M. Exercise for chronic musculoskeletal pain: A biopsychosocial approach. *Musculoskeletal Care*. 2017 Dec;15(4):413-421. doi: 10.1002/msc.1191. Epub 2017 Mar 30. PMID: 28371175