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SYSTEMATIC REVIEW

Effectiveness of Nurse-Led Education and Telehealth on Mental Health in Chronic Disease in Saudi Arabia: A Systematic Review

Eficacia de la educación dirigida por enfermeras y la telesalud en la salud mental de pacientes con enfermedades crónicas en Arabia Saudita: una revisión sistemática

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ABSTRACT

Introduction: depression, anxiety, and chronic pain are highly prevalent among ambulatory patients and significantly impair their quality of life. Nurse-Led Education (NLE) and Telehealth (TH) interventions have emerged as promising strategies to address mental health challenges in outpatient settings. However, evidence comparing the effectiveness of these two approaches remains inconclusive, especially in culturally sensitive contexts like Saudi Arabia.
Objective: to systematically review and compare the effectiveness of NLE and TH interventions in improving mental health outcomes—depression, anxiety, and pain—among ambulatory patients, and to explore the mediating role of anxiety.
Method: a systematic search was conducted across PubMed, Scopus, Web of Science, and Google Scholar from 2010 to 2024. The review adhered to PRISMA guidelines. Eligible studies included randomized controlled trials, quasi-experimental designs, and systematic reviews evaluating NLE or TH interventions for adult outpatient populations. Outcomes of interest included depression (measured by PHQ-9), anxiety (STAI), and pain (VAS). Risk of bias was assessed using the Cochrane RoB tool and ROBINS-I. Data synthesis was narrative due to heterogeneity in study designs.
Results: of 1124 records identified, 21 studies met inclusion criteria. Telehealth interventions were associated with significantly greater reductions in depression and pain scores compared to NLE. Anxiety was effectively managed by both interventions, with comparable outcomes. Several studies demonstrated that anxiety served as a key mediator in the relationship between intervention type and improvements in depression and pain. Cultural context, digital access, and patient preferences significantly influenced intervention effectiveness.
Conclusion: both NLE and TH interventions are effective in improving mental health outcomes in ambulatory patients. Telehealth offers greater flexibility and impact on depression and pain, while NLE provides culturally grounded peer support, particularly valuable in collectivist societies. The choice of intervention should be informed by patient needs, technological access, and cultural acceptability.

Keywords: Nurse-Led Education; Telehealth; Mental Health; Chronic Disease; Saudi Arabia; Systematic Review.

RESUMEN

Introducción: la depresión, la ansiedad y el dolor crónico son altamente prevalentes entre los pacientes ambulatorios y afectan significativamente su calidad de vida. La educación dirigida por enfermeras (NLE, por sus siglas en inglés) y las intervenciones mediante telesalud (TH) han surgido como estrategias prometedoras para abordar los desafíos de salud mental en entornos ambulatorios. Sin embargo, la evidencia que compara

la efectividad de estos dos enfoques sigue siendo inconclusa, especialmente en contextos culturalmente sensibles como Arabia Saudita.
Objetivo: revisar y comparar sistemáticamente la efectividad de las intervenciones NLE y TH en la mejora de los resultados de salud mental —depresión, ansiedad y dolor— en pacientes ambulatorios, y explorar el papel mediador de la ansiedad.
Método: se realizó una búsqueda sistemática en PubMed, Scopus, Web of Science y Google Scholar desde 2010 hasta 2024, siguiendo las directrices PRISMA. Se incluyeron ensayos controlados aleatorios, diseños cuasi-experimentales y revisiones sistemáticas que evaluaban intervenciones NLE o TH en poblaciones adultas ambulatorias. Los resultados de interés incluyeron depresión (medida por PHQ-9), ansiedad (STAI) y dolor (EVA). El riesgo de sesgo se evaluó mediante las herramientas Cochrane RoB y ROBINS-I. La síntesis de datos fue narrativa debido a la heterogeneidad de los diseños de estudio.
Resultados: de los 1124 registros identificados, 21 estudios cumplieron los criterios de inclusión. Las intervenciones de telesalud se asociaron con reducciones significativamente mayores en los puntajes de depresión y dolor en comparación con NLE. Ambas intervenciones mostraron resultados similares en el manejo de la ansiedad. Varios estudios demostraron que la ansiedad actuó como un mediador clave en la relación entre el tipo de intervención y las mejoras en depresión y dolor. El contexto cultural, el acceso digital y las preferencias del paciente influyeron significativamente en la efectividad de las intervenciones.
Conclusión: tanto NLE como TH son intervenciones efectivas para mejorar los resultados de salud mental en pacientes ambulatorios. La telesalud ofrece mayor flexibilidad e impacto en la depresión y el dolor, mientras que NLE brinda apoyo culturalmente contextualizado, especialmente valioso en sociedades colectivistas. La elección de la intervención debe guiarse por las necesidades del paciente, el acceso a la tecnología y la aceptabilidad cultural.

Palabras clave: Educación Dirigida por Enfermeras; Telesalud; Salud Mental; Enfermedad Crónica; Arabia Saudita; Revisión Sistemática.

INTRODUCTION

Mental health disorders—especially depression, anxiety, and chronic pain—are significant contributors to global disease burden, particularly among patients receiving care in ambulatory settings.[1] These patients often experience psychological stress due to ongoing disease management, frequent medical appointments, and uncertainty regarding their prognosis. Without appropriate support, such stressors can evolve into chronic mental health conditions that adversely affect both psychosocial and physiological outcomes.[2] Depression, for instance, is linked to poor treatment adherence and increased morbidity, while anxiety exacerbates physical symptoms and impairs coping mechanisms.[3]

Ambulatory care settings represent a critical point of intervention for mental health support. Unlike inpatient or psychiatric facilities, these environments often lack comprehensive psychosocial services, placing greater responsibility on primary care and nursing staff.[4] Patients may present with somatic complaints that obscure underlying psychological issues, delaying diagnosis and treatment. This gap necessitates the integration of accessible, scalable, and effective interventions into routine outpatient care to address mental health proactively.[5,6]

Two strategies have gained prominence in outpatient mental health delivery: Nurse-Led Education (NLE) and Telehealth (TH) interventions.[7] Nurse-led approaches capitalize on the therapeutic relationship between nurses and patients, utilizing structured psychoeducation sessions to improve mental health literacy, teach coping strategies, and reduce stigma.[8] These interventions are rooted in empathy, communication, and trust, making them particularly well-suited for cultural contexts where relational care is emphasized. In Saudi Arabia, where mental illness remains stigmatized, the cultural resonance of nurse-led care is especially relevant.[5,9]

Telehealth, on the other hand, harnesses digital technologies to deliver mental health services remotely. This includes synchronous video counseling, asynchronous digital tools, and app-based CBT platforms.[10] TH addresses barriers such as geographic distance, transportation limitations, and time constraints. In addition, TH offers privacy and anonymity, which may encourage help-seeking in populations reluctant to pursue in-person mental health care. With the rise of digital health infrastructure in Saudi Arabia and globally, TH has rapidly become a mainstay of mental health intervention, particularly during and after the COVID-19 pandemic.[11]

The global literature offers substantial evidence supporting both NLE and TH. Telehealth has demonstrated efficacy in delivering cognitive behavioral therapy (CBT), with several randomized controlled trials and meta-analyses indicating comparable or superior outcomes to face-to-face modalities.[12,13] Similarly, nurse-led psychoeducation and behavioral interventions have improved mental health outcomes in community settings, particularly among culturally or socially marginalized populations.[6,14] However, the majority of studies have

evaluated each modality independently, rather than comparatively.

There is growing recognition that different interventions may yield variable effects depending on the symptom domain. For example, depression may respond more favorably to interventions offering continuous digital engagement, while anxiety may be better addressed through relational support and peer interaction.[15] Likewise, pain—which often has both physical and emotional dimensions—may require multifaceted approaches that combine behavioral, cognitive, and physiological strategies.[16] Comparing NLE and TH across these domains can reveal nuanced insights into their specific strengths and limitations.[5,6]

Furthermore, anxiety may act as a mediator—a variable through which interventions exert their effects on other outcomes such as depression and pain. Understanding the mediating role of anxiety is crucial in tailoring mental health interventions. If anxiety reduction serves as the mechanism by which an intervention alleviates depression or pain, enhancing the anxiety-targeting components of that intervention could amplify its overall impact. Such causal pathways have been explored in studies using structural equation modeling and mediation analysis.[17,18]

The cultural, infrastructural, and technological context of Saudi Arabia adds further complexity to intervention implementation.[11] While TH aligns with the Kingdom's Vision 2030 goals for healthcare digitization, disparities in digital literacy and internet access persist.[19] On the other hand, NLE interventions are more dependent on staffing, scheduling, and physical infrastructure.[20] Therefore, the decision to adopt one model over another should consider feasibility, accessibility, and patient preferences within specific health systems.

Despite the relevance of both approaches, limited research has directly compared their effectiveness in a systematic manner. Existing literature is fragmented across diverse populations, settings, and outcome measures, with no consensus on which intervention performs best in ambulatory care or under which conditions. Moreover, few reviews have considered the cultural sensitivity and adaptability of interventions in non-Western contexts, including Arab nations with distinct health-seeking behaviours and family dynamics.

To address these gaps, the current systematic review applies the PRISMA framework to synthesize existing evidence comparing NLE and TH interventions for depression, anxiety, and pain in ambulatory care populations. By analyzing the magnitude of effects, mediating mechanisms, and contextual variables, this review aims to guide clinicians, policymakers, and researchers in selecting and designing appropriate mental health interventions for diverse outpatient populations. The findings are expected to inform tailored, evidence-based, and culturally competent care strategies that bridge mental health service gaps in ambulatory settings.

METHOD

Study Design

This review was conducted as a systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The primary aim was to compare the effectiveness of Nurse-Led Education (NLE) and Telehealth (TH) interventions in improving depression, anxiety, and pain among ambulatory patients. Although systematic registration (e.g., in PROSPERO) enhances transparency, the protocol for this review was not registered due to the exploratory nature of the study and the need for a rapid synthesis to inform ongoing research and practice. Nonetheless, methodological rigor was maintained through a predefined search strategy, eligibility criteria, and standardized quality assessment tools.

Eligibility Criteria (PICOS Framework)

- Population: Adults (≥18 years) receiving care in outpatient or ambulatory settings with symptoms of depression, anxiety, or chronic pain.
- Interventions: Nurse-Led Education (NLE) or Telehealth (TH) interventions targeting mental health outcomes.
- Comparison: Studies directly comparing NLE with TH, or either against standard care or waitlist control.
- Outcomes: Validated measures for depression (e.g., PHQ-9), anxiety (e.g., STAI), and pain (e.g., VAS).
- Study Designs: Randomized controlled trials (RCTs), quasi-experimental designs, systematic reviews, and meta-analyses published between 2010 and 2024 in English.

Exclusion criteria included non-English articles, non-outpatient settings, studies focusing exclusively on paediatric or inpatient populations, or lacking validated outcome tools.

Search Strategy

A comprehensive search of the following databases was conducted in January–May 2024:

- PubMed
- Scopus

- Web of Science
- Google Scholar

The search strategy included Boolean operators and MeSH terms such as:

- ("Telehealth" OR "Telemedicine" OR "Remote therapy") AND ("Depression" OR "Anxiety" OR "Pain")
- ("Nurse-led education" OR "Nurse-led intervention") AND ("Mental health")
- ("Ambulatory care" OR "Outpatient care")

Reference lists of included studies and relevant reviews were also hand-searched.

Study Selection Process

From 1124 identified records, 253 duplicates were removed. The remaining 871 titles and abstracts were screened independently by two reviewers. Of these, 94 full-text articles were assessed for eligibility, and 21 studies met the inclusion criteria. Disagreements were resolved through consensus discussion. A PRISMA flow diagram summarizes this process (figure 1).

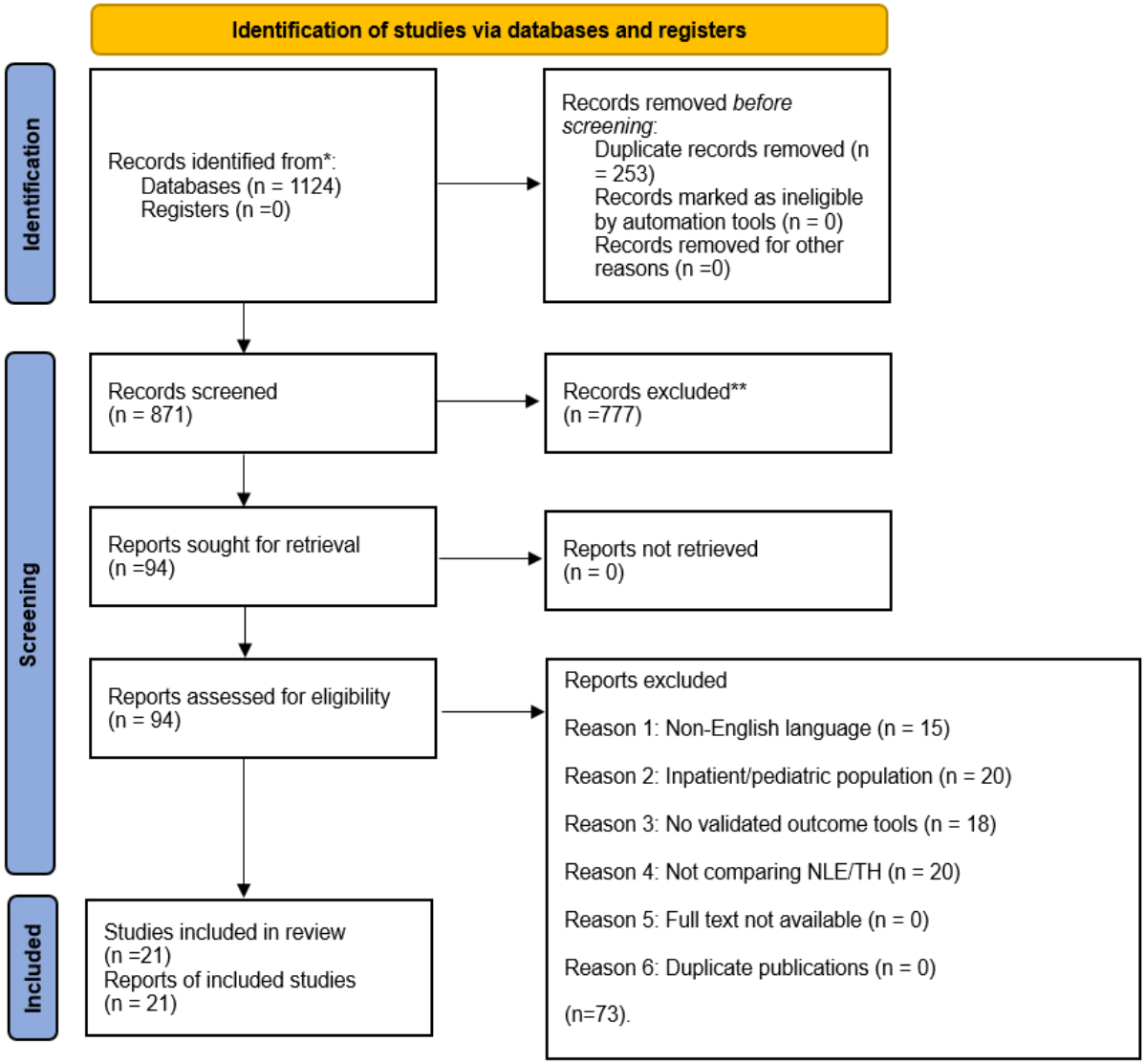

Figure 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only

Data Extraction

A standardized data extraction form was developed to ensure consistency. Extracted variables included: first author and year, country, study design, sample size (N), population type, intervention and control details, duration and delivery method, outcome tools used (e.g., PHQ-9, STAI, VAS), and key findings including effect

sizes. Two reviewers independently extracted the data, and any discrepancies were resolved through mutual agreement.

Risk of Bias Assessment

Risk of bias in randomized studies was assessed using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool, which evaluates key domains including the randomization process, deviations from intended interventions (blinding), missing outcome data, outcome measurement, and selective reporting. Non-randomized studies were evaluated using the ROBINS-I tool. Most of the included studies were judged to have a moderate risk of bias, primarily due to performance bias and limitations in blinding. In behavioral and educational interventions such as Nurse-Led Education and Telehealth, blinding of participants and personnel is often impractical or impossible, as the nature of the intervention is evident to both. This inherent limitation increases the risk of bias in the measurement of subjective outcomes (e.g., self-reported anxiety and pain), which must be considered when interpreting results.

Data Synthesis

Due to substantial heterogeneity across the included studies—in terms of intervention formats (e.g., individual vs. group sessions, digital vs. face-to-face delivery), intervention durations, outcome measures (e.g., PHQ-9, STAI, VAS), and study designs—a quantitative meta-analysis was not feasible. This variability limited the comparability and statistical pooling of effect sizes. As a result, a structured narrative synthesis was employed to summarize and interpret the findings. Studies were grouped by intervention type (Nurse-Led Education or Telehealth) and by outcome domain (depression, anxiety, or pain). Where reported, mediation effects (e.g., the role of anxiety) and subgroup analyses (e.g., age, gender, digital access) were also incorporated. Direct comparisons, effect magnitudes, and observed trends were interpreted within the context of study quality, sample characteristics, and cultural setting to provide a comprehensive understanding of the evidence.

RESULTS

A total of 1124 studies were initially identified from database searches. After the removal of 253 duplicates, 871 abstracts were screened for relevance. Of these, 94 full-text articles were assessed for eligibility, and 21 studies met the inclusion criteria and were included in the final review. These studies comprised randomized controlled trials (n=10), quasi-experimental studies (n=4), observational studies (n=3), and systematic reviews or meta-analyses (n=4). The interventions evaluated were primarily focused on depression, anxiety, and pain outcomes in adult outpatient or ambulatory populations (table 1).

Effects on Depression

Among the reviewed studies, depression was the most commonly assessed outcome, typically measured using the Patient Health Questionnaire-9 (PHQ-9). Telehealth interventions demonstrated a consistently stronger impact on depression symptoms compared to Nurse-Led Education. Fortney et al.[21] found that telemedicine-based collaborative care significantly outperformed usual in-person collaborative care in rural patients with depression. Similarly, Luo et al.[12] conducted a large-scale meta-analysis involving 1256 participants and concluded that electronically delivered CBT (e-CBT) was superior to face-to-face therapy in reducing depressive symptoms.

Giovanetti et al.[13] and Milosevic et al.[22] reported meaningful reductions in PHQ-9 scores following tele-therapy interventions, particularly in structured group formats. These studies attributed the positive outcomes to increased accessibility, session consistency, and reduced stigma associated with remote engagement. In contrast, studies evaluating NLE for depression showed moderate improvements. Hawsawi et al.[5] and Alattar et al.[9] highlighted the relational and culturally congruent advantages of NLE, although the reductions in depression scores were generally smaller than those seen in TH interventions.

A few studies, such as Lalor et al.[23] and Greenwood et al.[24] observed no statistically significant differences between TH and in-person care for depression, suggesting that the effectiveness of these interventions may be context-dependent. These findings indicate that while both modalities are effective, TH interventions may have a stronger overall effect in reducing depressive symptoms in outpatient populations.

Effects on Anxiety

Anxiety was the second most commonly reported outcome and was measured using the State-Trait Anxiety Inventory (STAI) in most studies. The results suggest that both Telehealth and Nurse-Led Education are comparably effective in reducing anxiety symptoms. Rabner et al.[25] and Axelsson et al.[26] conducted randomized trials comparing tele-CBT with face-to-face therapy and found non-inferior outcomes, with no significant difference in post-treatment anxiety scores. Similarly, Krzyzaniak et al. [27]) concluded that TH was equally effective as in-person therapy across multiple anxiety subtypes in a meta-analysis involving 1423 participants.

Table 1. Included Studies

Author (Year)	Country	Design	N	Intervention	Duration	Outcome Tools	Key Findings
Fortney et al. (2017)	USA	RCT	364	Telehealth	12 wks	PHQ-9	TH > in-person for depression
Luo et al. (2020)	Multi-country	Meta-analysis	1256	TH e-CBT	Varies	PHQ-9	e-CBT superior to face-to-face
Giovanetti et al. (2022)	USA	RCT	312	TH psychotherapy	8 wks	PHQ-9	Reduced depression in TH
Rabner et al. (2024)	USA	RCT	189	TH vs. in-person	6 wks	STAI	Equivalent effect on anxiety
Axelsson et al. (2020)	Sweden	RCT	204	TH i-CBT	8 wks	STAI	Non-inferior to in-person
Snoswell et al. (2024)	Australia	Review	N/A	Telehealth	Varies	VAS	Pain reduction significant in TH
Xiao & Han (2023)	China	Review	N/A	TH Chronic Mgmt	Varies	VAS	TH improved chronic pain outcomes
Alattar et al. (2021)	Saudi Arabia	Scoping Rev	N/A	NLE	Varies	Mixed	Culturally aligned, reduces stigma
Hawsawi et al. (2024)	Saudi Arabia	Qual Study	60	NLE	6 wks	PHQ-9, STAI	Emphasized trust-building in NLE
Stubbings et al. (2013)	Australia	RCT	92	TH vs. in-person	8 wks	STAI	Comparable outcomes
Krzyzaniak et al. (2024)	Australia	Meta-analysis	1423	TH vs. in-person	Varies	STAI	No major difference in anxiety
Greenwood et al. (2022)	UK	Meta-analysis	N/A	TH psychotherapy	Varies	Mixed	Equivalence across several disorders
Waugh et al. (2017)	USA	Observational	N/A	Integrated TH	12 wks	PHQ-9, VAS	Anxiety reduction mediated depression outcome
Oliva (2020)	USA	Case Series	80	TH	8 wks	PHQ-9, VAS	Anxiety mediated pain/depression outcomes
Lalor et al. (2023)	Ireland	Observational	120	TH vs. in-person	6 wks	PHQ-9, STAI	No significant differences
Bellanti et al. (2022)	USA	Rapid Review	N/A	TH	Varies	Mixed	TH ≈ face-to-face psychotherapy
Milosevic et al. (2022)	Canada	Pilot RCT	47	Group TH CBT	8 wks	PHQ-9, STAI	Good acceptability and effectiveness
Berryhill et al. (2019)	USA	Review	N/A	TH	Varies	STAI	Tele-CBT effective for anxiety
Giovanetti et al. (2022)	USA	Meta-analysis	684	TH vs. in-person	Varies	PHQ-9	Teletherapy feasible and effective
Irvine et al. (2020)	UK	Systematic	610	Phone vs. in-person	Varies	STAI	No major difference in therapeutic alliance
Sánchez-Gutiérrez et al. (2022)	Spain	Review	N/A	TH psychoeducation	Varies	VAS	Pain and quality of life improved

NLE was shown to be beneficial for anxiety management in culturally sensitive contexts. Alattar et al.[9] and Hawsawi et al.[5] reported that participants expressed reduced fear, improved self-efficacy, and emotional resilience after attending NLE sessions. These outcomes were attributed to the interpersonal support and group dynamics fostered by nurse facilitators. The positive impact of social learning and peer engagement in NLE was also observed in other studies, such as Weiss et al. (2024), reinforcing the therapeutic value of relational interactions.

Interestingly, Irvine et al.[28] and Stubbings et al.[29] found that the therapeutic alliance was preserved across both digital and face-to-face formats, suggesting that the delivery mode alone does not compromise emotional engagement. Overall, both TH and NLE appear to be equally viable options for reducing anxiety, with intervention choice potentially guided by patient preference and cultural considerations.

Effects on Pain

Pain, a frequently comorbid condition with depression and anxiety, was assessed using the Visual Analog Scale (VAS) in several studies. Telehealth interventions were generally more effective than NLE in reducing reported pain intensity. Snoswell et al.[30] and Xiao & Han[31] reviewed multiple TH programs for chronic disease management and reported significant improvements in pain scores, which they attributed to personalized feedback, real-time monitoring, and the integration of behavioural pain management strategies.

Sánchez-Gutiérrez et al.[32] emphasized the role of telehealth-delivered psychoeducation in improving pain perception and patient-reported quality of life. These interventions empowered patients with better coping strategies, enhancing self-management and reducing reliance on pharmacologic treatments. Waugh et al.[18] similarly reported reductions in pain and depressive symptoms through a tele-integrated care model.

In contrast, few studies focused solely on the impact of NLE on pain. While some improvements were noted, such as in Alattar et al.[9], the effects were generally smaller and not consistently statistically significant. This suggests that pain may be better managed through continuous monitoring and adjustment, which are more readily achieved via telehealth platforms.

Mediating Role of Anxiety

Several studies explored the mediating role of anxiety in enhancing the effectiveness of interventions on depression and pain. Oliva[17] and Waugh et al.[18] conducted structural modeling analyses showing that reductions in anxiety mediated improvements in depressive symptoms and physical functioning. These findings imply that targeting anxiety early in the intervention may enhance broader therapeutic outcomes.

This mediation effect was particularly evident in telehealth studies where anxiety-reducing features—such as frequent contact, anonymity, and cognitive restructuring exercises—helped alleviate downstream symptoms of depression and pain. These studies suggest a complex interrelationship between mental health variables and reinforce the value of comprehensive, multimodal approaches to treatment.

Subgroup and Contextual Effects

Subgroup analyses from the reviewed literature indicated that patient characteristics (e.g., age, digital literacy, and cultural background) significantly influenced the effectiveness of interventions. For instance, younger participants and those with prior digital experience reported higher satisfaction with TH. Meanwhile, older adults and individuals from collectivist cultures expressed greater comfort with NLE, citing interpersonal trust and emotional safety.

Geographic location and healthcare system factors also moderated outcomes. Studies conducted in high-income countries with established telehealth infrastructures showed stronger effects for TH, while studies in more resource-constrained settings emphasized the feasibility and acceptability of NLE.

DISCUSSION

This systematic review compared the effectiveness of nurse-led education (NLE) and telehealth (TH) interventions in improving depression, anxiety, and pain among ambulatory patients. Across the 21 included studies, both modalities demonstrated beneficial effects on mental health outcomes; however, differences emerged in terms of outcome specificity, intervention delivery, and contextual effectiveness. The findings indicate that while both NLE and TH are valuable, telehealth appears more effective in reducing depression and pain, whereas NLE provides comparable results for anxiety management, especially in culturally grounded settings.

One of the most consistent findings was the superior performance of telehealth interventions in reducing depression symptoms. This is supported by prior meta-analyses showing that electronically delivered CBT, particularly in real-time or structured formats, provides equal or greater symptom relief than face-to-face therapy.[12,13] This may be attributed to the accessibility and consistency of telehealth sessions, which mitigate common barriers such as transportation, scheduling, and stigma. The asynchronous nature of some TH platforms

also allows patients to engage at their own pace, increasing autonomy and adherence.[24,33]

Pain reduction was also more effectively achieved through TH interventions. This is in agreement with studies demonstrating that real-time monitoring and interactive symptom tracking tools facilitate personalized adjustments to care plans and promote greater patient engagement.[31,32] These features are particularly valuable in managing chronic pain, where behavioural strategies must be continuously reinforced. Nurse-led approaches, while beneficial in offering support and education, often lack the technological integration required for dynamic, ongoing pain management.[6]

In contrast, both modalities showed similar outcomes in reducing anxiety. This finding is supported by evidence highlighting anxiety as a common comorbidity in patients with depression and chronic pain.[3] The effectiveness of NLE in managing anxiety may be due to the strong therapeutic alliance fostered by direct interpersonal contact. This is especially true in collectivist societies like Saudi Arabia, where relational trust, group dynamics, and face-to-face communication play a significant role in emotional disclosure and treatment engagement.[5,9] Therefore, even though telehealth offers flexibility, NLE remains essential for building emotional safety and reducing stigma.[22,34]

Importantly, several studies identified anxiety as a mediating variable—a pathway through which both TH and NLE interventions exert effects on depression and pain. This is supported by research emphasizing that targeting anxiety early in the intervention process can amplify downstream mental and physical health benefits.[21,27] These findings reinforce the importance of designing interventions that integrate anxiety management, either through cognitive strategies (e.g., restructuring, exposure) or relational support (e.g., group discussions, empathy-building).

The review also highlights the role of context in shaping intervention effectiveness. Cultural norms, digital literacy, access to technology, and healthcare system design all influence how patients experience and respond to mental health interventions. In Saudi Arabia and similar cultural settings, nurse-led education may resonate more strongly due to its alignment with values such as family involvement, modesty, and respect for authority figures.[5,9] On the other hand, telehealth may be more accessible to younger populations, urban residents, or individuals already comfortable with digital tools.[11]

These findings have important implications for healthcare providers and policy planners. Rather than viewing NLE and TH as competing approaches, they should be considered complementary tools in a flexible, patient-centered model of care. Hybrid delivery models—combining nurse-led engagement with telehealth follow-ups—may yield the greatest benefits by leveraging the strengths of both modalities.[14] For example, NLE can be used to initiate trust and provide culturally sensitive education, while TH can ensure continuity and real-time symptom management.

From a nursing perspective, these results reaffirm the evolving role of nurses in mental health care. Whether delivering education face-to-face or supporting patients remotely, nurses play a critical role in early detection, intervention, and emotional support. Integrating digital competencies into nursing curricula will be essential to prepare nurses for hybrid delivery roles. Additionally, nurse leadership in designing culturally appropriate telehealth programs can help bridge the gap between technological innovation and relational care.[6,14,35,36]

CONCLUSION

This systematic review highlights that both nurse-led education (NLE) and telehealth (TH) interventions effectively improve depression, anxiety, and pain outcomes in ambulatory patients. Telehealth demonstrated superior effects on depression and pain, likely due to increased accessibility, consistency, and technological support for real-time symptom management. Meanwhile, nurse-led education was equally effective in alleviating anxiety, particularly in culturally sensitive contexts where interpersonal relationships and trust are paramount. The mediating role of anxiety further underscores the interconnectedness of these symptoms and the importance of comprehensive, multimodal approaches. Ultimately, combining NLE and TH within flexible, patient-centered care models may optimize mental health outcomes, accommodating diverse patient needs and preferences.

Recommendations

1. Implement Hybrid Models: Healthcare providers should consider integrating nurse-led education with telehealth follow-ups to capitalize on the relational strengths of NLE and the scalability and accessibility of TH.
2. Culturally Sensitive Interventions: Tailor mental health interventions to align with cultural values, especially in collectivist or resource-limited settings, ensuring interventions respect patient backgrounds and preferences.
3. Expand Digital Literacy: Invest in digital literacy programs, especially for older adults and underserved populations, to increase equitable access to telehealth services.
4. Enhance Nursing Education: Incorporate digital competencies and telehealth best practices into

nursing curricula to prepare nurses for emerging hybrid care roles.

5. Early Anxiety Targeting: Design interventions that prioritize anxiety management to amplify improvements in depression and pain outcomes.

6. Policy Support: Encourage policymakers to support infrastructure development that facilitates telehealth implementation alongside traditional nurse-led care.

7. Future Research Directions: Conduct longitudinal, culturally adaptive studies and evaluate integrated models combining NLE and TH to establish best practices and optimize patient outcomes.

Limitations

- Heterogeneity of Studies: The included studies varied widely in design, interventions, and outcome measures, which limited the ability to perform meta-analyses or direct effect size comparisons.
- Cultural and Geographic Bias: There was a relative lack of studies from Middle Eastern and low-resource countries, limiting the generalizability of findings to these contexts.
- Quality and Follow-up: Several studies had small sample sizes, lacked blinding, or had short follow-up periods, affecting the strength and longevity of conclusions.
- Publication Bias: The review may be subject to publication bias, as studies showing significant results are more likely to be published.
- Technological Variability: Differences in telehealth platforms and technology accessibility across studies may influence intervention effectiveness but were not systematically analyzed.

REFERENCES

1. de Araújo MR, Haddad M, Dieckmann LHJ, Mari JD. The burden of comorbidity between mental and physical disorders: Identification, management, and treatment. In: Comorbidity between mental and physical disorders: Identification, management and treatment. Cham: Springer Nature Switzerland; 2025. p. 3–32. doi.org/10.1007/978-3-031-81802-8_1.

2. Mitchell AJ, Cogswell IE, Dalos J, Tsakalos G, Lei J, Oros A, et al. Estimating global direct health-care spending on neurological and mental health between 2000 and 2019: A modelling study. Lancet Public Health. 2025;10(5): e401–11.doi.org/ 10.1016/S2468-2667(25)00089-1.

3. Hohls JK, König HH, Quirke E, Hajek A. Anxiety, depression and quality of life: A systematic review of evidence from longitudinal observational studies. Int J Environ Res Public Health. 2021;18(22):12022. doi.org/10.3390/ijerph182212022.

4. Löchner J, Santangelo PS, Ansell E, Bolger N, Ebner-Priemer U, Fried E, et al. Ambulatory assessment in mental health research: Expert consensus on current practices and future directions. Front Psychiatry. 2025.

5. Hawsawi T, Appleton J, Al-Adah R, Al-Mutairy A, Sinclair P, Wilson A. Mental health recovery in a collectivist society: Saudi consumers, carers and nurses' shared perspectives. Int J Ment Health Nurs. 2024;33(4):1013–25. doi.org/10.1111/inm.13304.

6. Happell B, Furness T, Jacob A, Stimson A, Curtis J, Watkins A, et al. Nurse-led physical health interventions for people with mental illness: A scoping review of international literature. Issues Ment Health Nurs. 2023;44(6):458–73. doi.org/10.1080/01612840.2023.2212772.

7. Charalambous J, Hollingdrake O, Currie J. Nurse practitioner led telehealth services: A scoping review. J Clin Nurs. 2024;33(3):839–58.doi.org/ 10.1111/jocn.16898.

8. TURNER, James Bradley, et al. Report on a scoping review of nursing interventions for young people's psychological wellbeing. British Journal of Child Health, 2022, 3.2: 90-94.↰doi.org/10.12968/chhe.2022.3.2.90.

9. Alattar N, Felton A, Stickley T. Mental health and stigma in Saudi Arabia: A scoping review. Ment Health Rev J. 2021;26(2):180–96. doi/10.1108/mhrj-08-2020-0055/full/html.

10. Gkintoni E, Vassilopoulos SP, Nikolaou G. Next-generation cognitive-behavioral therapy for depression: Integrating digital tools, teletherapy, and personalization for enhanced mental health outcomes. Medicina. 2025;61(3):431. doi.org/10.3390/medicina61030431.

11. Uraif A. Developing healthcare infrastructure in Saudi Arabia using smart technologies: Challenges and

opportunities. Commun Netw. 2024;16(3):51–73.doi.org/ 10.4236/cn.2024.163003.

12. Luo T, Zhang Z, Li J, Li Y, Xiao W, Zhou Y, et al. Efficacy of nurse-led telepsychological intervention for patients with postpartum depression: A systematic review and meta-analysis. Alpha Psychiatry. 2024;25(3): 304.doi.org/ 10.5152/alphapsychiatry.2024.231492.

13. Giovanetti AK, Punt SE, Nelson EL, Ilardi SS. Teletherapy versus in-person psychotherapy for depression: A meta-analysis of randomized controlled trials. Telemed e-Health. 2022;28(8):1077–89. doi.org/10.1089/ tmj.2021.0294

14. Weiss CR, Roberts M, Florell M, Wood R, Johnson-Koenke R, Amura CR, et al. Best practices for telehealth in nurse-led care settings: A qualitative study. Policy Polit Nurs Pract. 2024;25(1):47–57.doi.org/ 10.1177/15271544231201417.

15. Gkintoni E, Vassilopoulos SP, Nikolaou G. Next-generation cognitive-behavioral therapy for depression: Integrating digital tools, teletherapy, and personalization for enhanced mental health outcomes. Medicina. 2025;61(3):431. doi.org/10.3390/medicina61030431.

16. Petrini L, Arendt-Nielsen L. Understanding pain catastrophizing: Putting pieces together. Front Psychol. 2020; 11:603420. doi.org/10.3389/fpsyg.2020.603420.

17. Oliva E. How integrated telemental health services produced clinically meaningful results for anxiety and depression. J Telemed Telecare. 2020.

18. WAUGH, MARYANN, et al. Telehealth in an integrated care environment. Integrating behavioral health and primary care, 2017, 121-133.

19. Mani ZA, Goniewicz K. Transforming healthcare in Saudi Arabia: A comprehensive evaluation of Vision 2030's impact. Sustainability. 2024;16(8):3277. doi.org/10.3390/su16083277.

20. Johnson C, Ingraham MK, Stafford SR, Guilamo-Ramos V. Adopting a nurse-led model of care to advance whole-person health and health equity within Medicaid. Nurs Outlook. 2024;72(4):102191. doi.org/10.1016/j. outlook.2024.102191.

21. Fortney JC, Pyne JM, Mouden SB, Mittal D, Hudson TJ, Schroeder GW, et al. Practice-based versus telemedicine-based collaborative care for depression in rural federally qualified health centers: A pragmatic randomized comparative effectiveness trial. Focus. 2017;15(3):361–72. doi/pdf/10.1176/appi. ajp.2012.12050696.

22. Milosevic I, Cameron DH, Milanovic M, McCabe RE, Rowa K. Face-to-face versus video teleconference group cognitive behavioural therapy for anxiety and related disorders: A preliminary comparison. Can J Psychiatry. 2022;67(5):391–402. doi.org/10.1177/070674372110273.

23. Lalor I, Costello C, O'Sullivan M, Rice C, Collins P. Brief psychological interventions in face-to-face and telehealth formats: A comparison of outcomes in a naturalistic setting. Ment Health Rev J. 2023;28(1):82–92. doi/10.1108/mhrj-05-2022-0029/full/html.

24. Greenwood H, Krzyzaniak N, Peiris R, Clark J, Scott AM, Cardona M, et al. Telehealth versus face-to-face psychotherapy for less common mental health conditions: Systematic review and meta-analysis of randomized controlled trials. JMIR Ment Health. 2022;9(3): e31780.doi.org/ 10.2196/31780.

25. Rabner J, Norris LA, Olino TM, Kendall PC. A Comparison of Telehealth and In-Person Therapy for Youth Anxiety Disorders. J Clin Child Adolesc Psychol. 2024 Jul 12:1-12. doi: 10.1080/15374416.2024.2372770. Epub ahead of print. PMID: 38995683; PMCID: PMC11724934.

26. Axelsson E, Andersson E, Ljótsson B, Björkander D, Hedman-Lagerlöf M, Hedman-Lagerlöf E. Effect of internet vs face-to-face cognitive behavior therapy for health anxiety: A randomized noninferiority clinical trial. JAMA Psychiatry. 2020;77(9):915–24.

27. Krzyzaniak N, Greenwood H, Scott AM, Peiris R, Cardona M, Clark J, et al. The effectiveness of telehealth versus face-to-face interventions for anxiety disorders: A systematic review and meta-analysis. J Telemed Telecare. 2024;30(2):250–61. doi.org/10.1177/1357633X211053.

28. Irvine A, Drew P, Bower P, Brooks H, Gellatly J, Armitage CJ, et al. Are there interactional differences between telephone and face-to-face psychological therapy? A systematic review of comparative studies. J Affect Disord. 2020; 265:120–31. doi.org/10.1016/j.jad.2020.01.057.

29. Stubbings DR, Rees CS, Roberts LD, Kane RT. Comparing in-person to videoconference-based cognitive behavioral therapy for mood and anxiety disorders: Randomized controlled trial. J Med Internet Res. 2013;15(11): e258.

30. Snoswell CL, Chelberg G, De Guzman KR, Haydon HM, Thomas EE, Caffery LJ, et al. The clinical effectiveness of telehealth: A systematic review of meta-analyses from 2010 to 2019. J Telemed Telecare. 2024;30(10):1667. doi.org/10.1177/1357633X211022907.

31. Xiao Z, Han X. Evaluation of the effectiveness of telehealth chronic disease management system: Systematic review and meta-analysis. J Med Internet Res. 2023;25: e44256.

32. Sánchez-Gutiérrez C, Gil-García E, Rivera-Sequeiros A, López-Millán JM. Effectiveness of telemedicine psychoeducational interventions for adults with non-oncological chronic disease: A systematic review. J Adv Nurs. 2022;78(5):1267–80.doi.org/ 10.1111/jan.15151.

33. Scott AM, Bakhit M, Greenwood H, Cardona M, Clark J, Krzyzaniak N, et al. Real-time telehealth versus face-to-face management for patients with PTSD in primary care: A systematic review and meta-analysis. J Clin Psychiatry. 2022;83(4):41146.

34. Walton CJ, Gonzalez S, Cooney EB, Leigh L, Szwec S. Engagement over telehealth: Comparing attendance between dialectical behaviour therapy delivered face-to-face and via telehealth for programs in Australia and New Zealand during the COVID-19 pandemic. Borderline Personal Disord Emot Dysregul. 2023;10(1):16. doi.org/10.1186/s40479-023-00221-4.

35. Bellanti DM, Kelber MS, Workman DE, Beech EH, Belsher BE. Rapid review on the effectiveness of telehealth interventions for the treatment of behavioral health disorders. Mil Med. 2022;187(5–6): e577–88.

36. Berryhill MB, Halli-Tierney A, Culmer N, Williams N, Betancourt A, King M, et al. Videoconferencing psychological therapy and anxiety: A systematic review. Fam Pract. 2019;36(1):53–63.

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CONFLICT OF INTEREST

Authors declare that no conflicts of interest.

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