

INTRO

Chronic musculoskeletal (MSK) pain, particularly back pain, is a leading cause of disability and major contributor to healthcare utilization and costs.¹ Central sensitization can be a driving factor both in the presence and absence of structural damage.² In a study of chronic spine pain, central sensitization was the primary pain driver in 88% of cases.³ Behavioral and psychological approaches that help individuals reframe chronic pain as a non-threatening, centrally driven process can reduce central sensitization and improve pain and function.⁴ These findings support the need for interdisciplinary cognitive and behavioral interventions, however, gaps in effective, accessible, and multidisciplinary care persist. To address this, a multicomponent pain recovery program was developed to target reversible abnormal brain signaling in pain-related networks through education, coaching, and practice.

OBJECTIVE

This retrospective study evaluated the real-world implementation of a virtual pain recovery intervention leveraging neuroscience-informed and behavioral strategies on patient-reported outcomes in chronic MSK pain with central sensitization.

METHODS

Intervention: Lin Health’s insurance-reimbursable program consists of 1) one-on-one telehealth sessions with a trained pain recovery coach (supervised by physician team), 2) asynchronous coach-patient messaging, and 3) self-paced digital modules. Therapeutic components include pain neuroscience education, cognitive and somatic retraining with guided exposure therapy, nervous-system down-regulation, emotional awareness and expression techniques, among others. Patients completed a mean of 8.7 (SD 6.1) coaching sessions from baseline to month 6.

Measures: Patients received monthly surveys in app. Pain intensity (past week) was assessed using Numeric Rating Scale (NRS; range 0 to 10). Patient Global Impression of Change (PGIC; range 1=“very much improved” to 7=“very much worse”) assessed “*Compared to how you were before the program, how are you doing overall?*”

Population: Eligibility required MSK pain >3 months or clinical features suggesting central sensitization. “MSK Patients” = chronic MSK pain as primary symptom of concern; “Back Pain Patients” = chronic back or low back pain as primary symptom. Patients were referred by their provider or self-enrolled (2024 – 2025).

Statistical Analyses: Engagement and outcomes (baseline to month 6) were analyzed using descriptive statistics and linear regression.

A Virtual Multicomponent Behavioral Pain Recovery Intervention Improves Chronic MSK Pain and Condition

Figure 1. Monthly Patient Global Impression of Change (MSK Patients)



Figure 2. Monthly Change in Pain Intensity (MSK Patients)

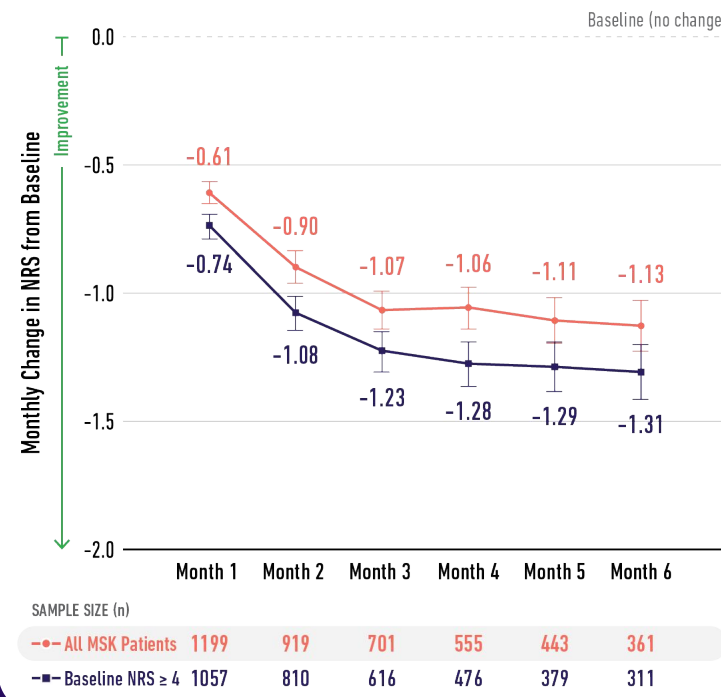


Figure 3. Monthly PGIC (Back Pain Subcohort)

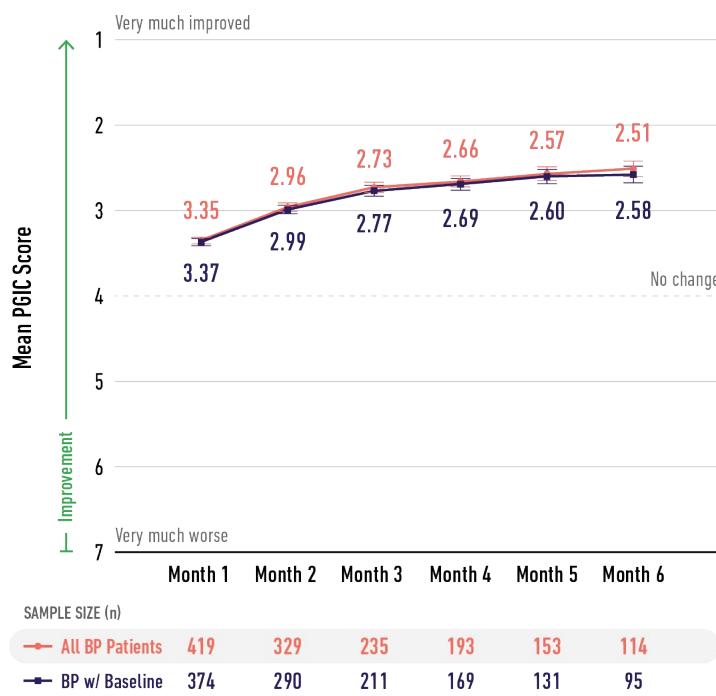


Figure 4. Monthly Change in Pain Intensity (Back Pain Subcohort)

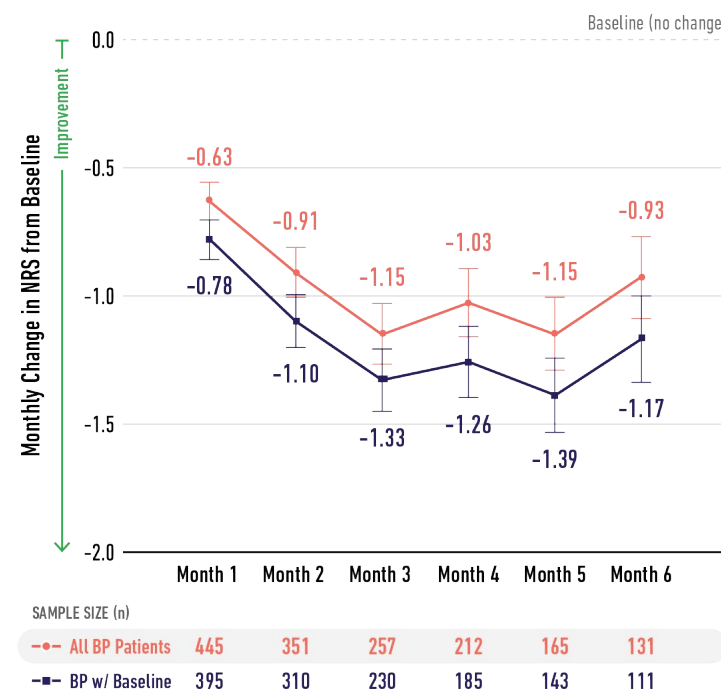


FIGURE NOTE

Error bars in the above figures represent ±SEM (Standard Error of the Mean).

DISCLOSURES

KM is a consultant to Lin Health. SB and EA hold shares and are employees of Lin Health. AB is an advisor to Lin Health.

REFERENCES

1. Rikard SM, Strahan AE, Schmit KM, Guy GP Jr. Chronic Pain Among Adults - United States, 2019-2021. MMWR Morb Mortal Wkly Rep. 2023;72(15):379-385. Published 2023 Apr 14. doi:10.15585/mmwr.mm7215a1
2. Nijs J, Torres-Cueco R, van Wilgen CP, et al. Applying modern pain neuroscience in clinical practice: criteria for the classification of central sensitization pain. Pain Physician. 2014;17(5):447-457.
3. Schubiner H, Lowry WJ, Heule M, et al. Application of a Clinical Approach to Diagnosing Primary Pain: Prevalence and Correlates of Primary Back and Neck Pain in a Community Physiatry Clinic. J Pain. 2024;25(3):672-681. doi:10.1016/j.jpain.2023.09.019
4. Lumley MA, Schubiner H. Psychological Therapy for Centralized Pain: An Integrative Assessment and Treatment Model. Psychosom Med. 2019;81(2):114-124. doi:10.1097/PSY.0000000000000654

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RESULTS

- **N=1,620** patients with chronic MSK pain completed baseline assessment; average age 55 (SD 15.6) years, baseline NRS 5.9 (SD 1.91). Among the cohort, 38% reported back pain, 17% fibromyalgia, 9% neck pain; the remaining patients reported one of 17 other MSK symptoms.
- **Pain intensity (NRS) decreased over time**, with 49.7%, 60.3%, and 61.5% of patients reporting improvement at months 1, 3, and 6, respectively, compared with 19.7%, 16.1%, and 15.5% reporting worsening.
- **PGIC outcomes improved over time**, with 55.6%, 83.1%, and 90.7% reporting improvement at months 1, 3, and 6, respectively, while worsening was uncommon (<5% at all timepoints). The proportion reporting much or very much improved increased from 14.1% at month 1 to 51.8% at month 6.
- Patients with **clinically significant MSK pain** (baseline NRS ≥4) (n= 1,444) reported **slightly greater NRS improvements** from baseline to month 1 (−0.74, SD 1.55) and baseline to month 6 (−1.31, SD 1.9) [see Figure 2].
- The subcohort reporting **back pain** as their primary symptom (n=613) experienced **similar improvements** as the overall MSK cohort [see Figure 3 and Figure 4].
- Number of **coaching sessions and minutes** in month 1 were **associated with improvement in PGIC** at 1 month (p< .001) after controlling for baseline NRS.

DISCUSSION

- A virtual pain recovery program targeting central sensitization was associated with reduced pain intensity and perceived symptom improvement in individuals with chronic MSK pain as early as one month. By month 3, MSK patients achieved meaningful reductions in pain intensity (NRS decrease ≥1) on average.
- The association between early coaching engagement and perceived global improvement suggests that active participation in pain recovery practices may contribute to outcomes and supports the potential modifiability of maladaptive central pain processing.
- Accessible and scalable therapies addressing central sensitization in chronic MSK pain have the potential to fill gaps in personalized, equitable care; continued research and practice using these approaches should be prioritized accordingly.
- Limitations inherent to the retrospective observational design include potential selection bias and inability to assess causality. Larger randomized studies are needed to confirm efficacy and evaluate long-term durability.