Longitudinal Outcomes for a 10-Week Interdisciplinary Pain Rehabilitation Program

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Objectives: Chronic pain is an important public health problem. Interdisciplinary pain rehabilitation programs (IPRPs) demonstrate immediate and long-term improvements in pain, functioning, and overall quality of life for individuals with chronic pain. However, data on treatment durability for different program models and patient populations are limited. The purpose of this study was to examine long-term outcomes of a 10-week IPRP.

Methods: Three hundred ninety-eight adults with chronic pain were treated at a rehabilitation hospital between February 2019 and May 2021 in an intensive 10-week outpatient IPRP consisting of physical therapy, occupational therapy, pain psychology, and medical management. Participants completed measures of pain intensity, pain interference, depressed mood, anxiety, physical functioning and pain catastrophizing at intake, discharge, and 3-month, 6-month, 9-month, and 12-month post-treatment.

Results: A total of 34.7% of participants returned postprogram surveys at 3 months, 26.9% at 6 months, 17.6% at 9 months, and 15.6% at 12 months. Participants were primarily female (79.1%), White/Caucasian (79.4%) and married (51.5%) with an average age of 49.30 ± 15.29 years. The results demonstrated statistically and clinically significant improvement across all outcome measures comparing intake to discharge. While there was some deterioration of treatment gains over time, all measures remained improved at all time points compared with intake.

Discussion: A 10-week IPRP model can improve pain and functioning in a population of patients with heterogenous chronic pain conditions in a community setting, providing durable improvements over time. These results add to the body of literature supporting IPRPs as an effective intervention for patients with chronic pain.

Key Words: chronic pain, interdisciplinary care, pain rehabilitation, long-term outcomes

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Interdisciplinary pain rehabilitation programs (IPRPs) represent low-risk, cost-effective, biopsychosocial treatment approaches for chronic pain.[1] Unlike unimodal or multidisciplinary approaches, IPRPs involve multiple treatment providers (ie, medical providers, psychologists, physical, and/or occupational therapists, etc.) providing integrated, coordinated care with a shared goals and treatment philosophy (eg,[2] a large body of research conducted over several decades indicates that IPRPs improve patients' functional outcomes upon program completion).[3–5] These benefits include reduced pain severity, decreased reliance on pharmacological interventions, improved mental health, increased physical functioning, improved sleep, higher return-to-work rates, greater pain self-efficacy, and an overall better health-related quality of life.[6–11] Multiple studies also suggest IPRP programs improve longer-term outcomes up to 24 months after treatment.[3,4,12–18]

While results are promising, the available data on the longevity of treatment gains is limited. Most studies on long-term outcomes provide only 1 or 2 follow-up data points at varying time points post-treatment, eg,[18–20] in addition, these studies vary in the duration, setting, and characteristics of each chronic pain program, eg,[6,21–23] much of the research in this area has included short-term, intensive, group-based programs (eg,[21,24,25] furthermore, many of the IPRPs in the literature focus on specific chronic pain conditions, such as the neck, low back, neuropathic pain, or musculoskeletal pain)[3,11,13,22,26] making it difficult to generalize to more heterogeneous chronic pain populations. These methodological differences stand in comparison to the research on pediatric IPRPs, which are notably more standardized in structure, duration, measurement, and treatment delivery across treatment programs described in the literature.[27,28]

Data on the long-term outcomes for IPRPs is essential to support the continuation and growth of these programs. Despite strong evidence for their clinical effectiveness, there has been a trend toward declining numbers of these programs in the United States. For illustration, the number of Commission on Accreditation of Rehabilitation Facilities (CARF) accredited interdisciplinary pain management programs declined from 210 programs in 1998 to only 84 in 2005[29] and 67 in 2017,[30] leading to a scarcity in access to this form of evidence-based care. This is concerning given that IPRPs have been shown to have similar or better clinical outcomes and greater cost savings compared with most other interventions for chronic pain (ie, medication, surgery, spinal cord stimulation, and intrathecal drug delivery systems), without the complications or adverse events present for these other treatments (for review, see 30). The Veterans Affairs Health care Systems, conversely, has seen an increase in IPRPs over the past several decades, representing almost one-third of accredited programs in the U.S.[31] This growth has not been seen in the private sector, despite evidence for long-term cost savings associated with these programs.[1,30,32,33] Given the financial burden of chronic pain conditions for patients, health care systems,

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and insurers, identifying long-term outcomes may support expansion of IPRPs as mainline treatment for high-impact health care users and decrease overall costs of treatment in the future.

The current study aims to examine long-term outcomes at 3, 6, 9, and 12 months post-treatment for adult patients following a 10-week IPRP. Recent research has supported the effectiveness of a 10-week model,[7] but the longer-term treatment gains for this model have not yet been evaluated. Furthermore, there is a need to identify effective treatment options that target a diverse set of chronic pain conditions and presentations. Our goals are to address these gaps in the literature and provide further support for the long-term clinical outcomes for IPRPs.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board (IRB) at Mary Free Bed Rehabilitation Hospital. A waiver of informed consent was obtained for the use of retrospective data.

Participants

Participants included 398 adults with chronic pain who were admitted to the Mary Free Bed Pain Rehabilitation Program between February 2019 and May 2021.

Procedure

Participants completed self-report questionnaire measures at admission and before discharge to assess a variety of domains, including pain intensity, pain interference, depressed mood, anxiety, physical functioning, and pain catastrophizing. Intake and discharge surveys were administered electronically on a tablet for patients seen in person or sent electronically through e-mail if the service was performed virtually. Discharge surveys were completed during the final week of treatment. Upon completion of the discharge survey, participants were given instructions to enter their e-mail addresses for follow-up surveys. Once e-mail addresses were entered into the system, participants were automatically sent follow-up electronic surveys to complete at the designated time frames.

Intervention

The IPRP involved 10 weeks of intensive treatment. Participants attended treatment for ~2 to 3 days per week for 2 to 4 hours per day (totaling 5 to 6 h/wk). Treatment involved physical therapy (2 sessions/wk), occupational therapy (2 sessions/wk), medical visits (1 to 2 sessions/mo), and pain psychology sessions (2 sessions/wk). Services were delivered in individual (vs. group) format. Interdisciplinary team members met weekly for a team conference to monitor the progress of each participant. Participants engaged in a medical evaluation before program admission to assess suitability for the program and confirm that they were physically and psychologically stable enough to participate. Patients were excluded if they had medical concerns requiring a higher level of care (eg, cardiac disease or cancer) or limiting the ability to participate in exercise (eg, uncontrolled asthma or malnutrition), acute conditions requiring resolution (eg, torn meniscus), or severe psychiatric symptoms (eg, active mania or psychosis or current/recent suicidal intent or plan).

The focus of the program was on functional restoration, informed by Acceptance and Commitment Therapy (ACT) approaches and Pain Neuroscience Education (PNE). Patients using opioids at program admission also underwent a structured opioid taper to reduce or eliminate opioid use. Patients graduated early or extended treatment on an occasional, case-by-case basis when clinically indicated. This program and its outcomes have been previously described in the literature.[7] Findings indicated improvement in pain severity, pain-related life interference, quality of life, anxiety, depressed mood, insomnia, pain catastrophizing, pain self-efficacy, and opioid reduction at discharge from the 10-week program compared with admission.[7]

Beginning at the onset of the COVID-19 pandemic (March 2020), participants were offered virtual (telehealth) services as an alternative to in-person care. During the local shelter-in-place order, all treatment was provided through telehealth. Only 12 patients were admitted to the program during that time and omitting these participants from the data set did not alter the interpretation of the findings. Following the shelter-in-place order, in-person treatment resumed but participants had the opportunity to engage in psychology services virtually on an ongoing basis based on patient preference (eg, illness, transportation issues, and scheduling convenience). A total of 7 participants (1.8%) completed all treatment virtually and 72 (18.1%) completed a portion of treatment virtually. Prior research has demonstrated no significant differences in outcomes based on virtual versus in-person psychology services (eg,[34–37] There were no differences between admission and discharge on any outcome measure in this study based on telehealth participation status).

Measures

Clinical and Demographic Variables

Sex, age, marital status, race/ethnicity, opioid use status, duration of chronic pain, and primary pain site were collected by chart review and clinician-entered data.

Pain Ratings

Pain severity ratings were gathered through patient self-report using the numeric pain scale. Patients rated average pain over the past month on a scale from 0 (no pain) to 10 (worse pain imaginable). This scale is commonly used in clinical and research settings.[38] Research suggests a change of 1.65 represents a clinically meaningful difference.[39] Due to using a 0 to 10 scale, we rounded to the nearest integer and used a threshold of 2 points for the current study.

Pain Reported Outcomes Measurement Information System (PROMIS)

PROMIS measures have been developed with support of the National Institute of Health (NIH) and are designed to be efficient and valid measures of perceived change across treatment.[40] Each assessment measures a specific domain, with many individual items being taken from "legacy" measures. Each domain includes a test bank of items developed using item response theory (IRT) and tested in several waves of psychometric evaluation.[41] Short forms were administered for each of the domains described below:

Pain Interference. The PROMIS-Pain Interference 8a[42] assesses pain-related life interference in social, recreational, emotional, and occupational domains. Items are rated from 1 (not at all) to 5 (very much). A total sum is then generated, which is converted into a T-score for interpretations. Higher

scores indicate more pain-related interference. Minimal clinically important difference (MCID) on this measure has been estimated to range between 3.5 and 5.5 points among patients with low back pain.[43] We used a threshold of 5.5 points for the current study. Internal consistency (Cronbach alpha) was excellent across time points (α = .93 to .98).

Depressed Mood. The PROMIS-Depression 8a and 4a[41] assess depressed mood over the last week. Items are rated on a scale from 1 (never) to 5 (always), producing a total score, which is then converted to a T-score. Participants were provided the 8-item version at intake and discharge and the 4-item version at all subsequent follow-up points. The 8-item and 4-item measures can be compared with one another utilizing T-scores. Higher scores represent increased severity of depressed mood. MCIDs for this measure in prior studies range from 2.7 to 4.29, with an optimal cut point estimated at 3.5. This threshold was used in the current study.[44,45] Internal consistency was high across all time points (α = .89 to .95).

Anxiety. The PROMIS-Anxiety 8a and 4a[41] assess the presence of anxiety symptoms over the last week. Items are rated on a scale from 1 (never) to 5 (always), producing a total score, which is then converted into a T-score. Participants were provided the 8-item version at intake and discharge and the 4-item version at all subsequent follow-up points. The 8-item and 4-item measures can be compared with one another utilizing T-scores. Higher scores represent increased severity of anxiety. MCID estimates have been found to range between 2.3 and 4.2.[45,46] An MCID threshold of 4.2 was used in this study. Internal consistency was good to excellent across time points (α = .89 to .95).

Physical Functioning. The PROMIS Physical Function-Short form 8b[47] measures a patients self-reported capacity for activity and functioning of upper and lower extremities, and central body regions, as well as tasks of daily living. Items are rated on a scale from 5 (without any difficulty/not at all) to 1 (unable to do/cannot do), leading to a single physical function capability score, which is then converted to a T-score. Higher scores indicate increased functional capacity. Consistent with prior research with patients with musculoskeletal pain, a MCID of 4.2 was used in this study.[48] Internal consistency for the measure was excellent at all time points (α = .91 to .95).

Pain Catastrophizing. The Pain Catastrophizing Scale (PCS);[49] is a 13-item measure of catastrophic thinking (ie, helplessness, rumination, and symptom magnification) in response to pain. Items are rated on a scale from 0 (not at all) to 4 (all of the time). MCIDs for this measure are estimated to range between 3 and 4.5 points.[50,51] We used the more conservative estimate of 4.5 points in this study. Higher scores indicate higher levels of catastrophic thinking. Internal consistency was excellent at each time point (α = .94 to .97).

Statistical Analyses

The goal of this study was to describe longer-term outcomes for participants of an IPRP. Therefore, analyses were conducted to describe and then compare patient self-report data from admission and discharge to 3, 6, 9, and 12 months post-treatment. Given the exploratory nature of this study and because no specific hypotheses were made about the relationship between time points, data were compared using dependent samples *t* tests comparing each time point (ie, all possible comparisons) for each outcome measure separately. Data were not analyzed using a repeated measures design with > 2 time points given that not all participants completed all time points and we aimed to preserve all data points in this exploratory study. Effect sizes are reported using Cohen *d*. The proportion of patients demonstrating clinically significant change was calculated by measuring the change in score from program admission using the MCID threshold defined for each measure above.

RESULTS

Participant Characteristics

Demographic and clinical characteristics of the sample are provided in Table 1. Patients (N = 398) were primarily female (79.1%), White/Caucasian (79.4%), and married (51.5%) with an average age of 49.30 ± 15.29 years. Most commonly, patients reported pain in multiple sites (27.4%) or fibromyalgia (26.1%). Average pain duration was 11.31 ± 12.24 years and 21.9% of patients were taking opioid pain medication at program admission.

Participation in the postprogram surveys included 138 at 3 months (34.7%), 107 at 6 months (26.9%), 70 at 9 months (17.6%), and 62 at 12 months (15.6%). Twenty-seven patients (6.8%) completed all 4 follow-up time points. A total of 179 ptients (45.0%) completed at least 1 follow-up time point.

Patients who completed at least 1 follow-up time point (n = 179) were compared with those who did not complete any follow up measures (n = 219) based on demographic characteristics (ie, sex, age, race/ethnicity, marital status, primary pain site, pain duration, and opioid use), and outcome measures (ie, pain intensity ratings, pain interference, depression, anxiety, physical functioning, and pain

TABLE 1. Participant Characteristics

Variable	M (SD) or frequency (%)
Age (y)	49.30 ± 15.29
Sex	
Male	83 (20.9)
Female	315 (79.1)
Race/ethnicity	
White/Caucasian	316 (79.4)
Black/African American	21 (5.3)
Hispanic/Latino/a	8 (2.0)
Other/undisclosed	53 (13.3)
Marital status	
Married	205 (51.5)
Single	59 (14.8)
Separated/divorced	51 (12.8)
Living with a partner	25 (6.5)
Widowed	6 (1.5)
Other/undisclosed	51 (12.8)
Pain Site	
Multiple	109 (27.4)
Fibromyalgia	104 (26.1)
Low back	43 (10.8)
Headache/migraine	35 (8.8)
Lower extremity	14 (3.5)
Upper extremity	14 (2.5)
Other	25 (6.3)
Missing	54 (13.6)
Pain duration (y)	11.31 ± 12.24
Current opioid use at admission	87 (21.9)

(N = 398).

catastrophizing at admission, discharge, and change from admission to discharge). Comparisons were made using independent-samples t tests and χ^2 analyses for continuous and categorical variables, respectively. There were no differences between those who did and did not complete follow-up measures for the following demographic and clinical variables: sex, race (white/Caucasian vs. other categories), marital status (married vs. other categories), opioid use, pain location (fibromyalgia/multiple sites vs. other categories), age, or pain duration (all Ps $>.21$). Results indicated that patients who did not complete follow-up surveys reported higher levels of baseline anxiety (62.17 ± 9.09) compared with those who completed at least 1 follow-up survey (60.17 ± 9.30), $t(395) = 2.15$, $P = .04$, $d = .22$. In addition, patients who did not complete follow up measures reported higher discharge pain ratings (4.63 ± 1.75) compared with those who did (4.16 ± 1.75), $t(396) = 2.71$, $P = .007$, $d = .27$. There were no differences between groups on other measures at admission, discharge, or change from admission to discharge (all Ps $>.06$). There were no differences in treatment outcomes (admission to discharge) based on participation before or after the onset of the COVID-19 pandemic (all Ps $>.17$) engagement in any telehealth services (all Ps $>.11$) or use of opioid pain medications on admission (all Ps $>.29$).

TABLE 3. Comparison of Average Pain Intensity Ratings By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	20.90***	6.78***	4.57***	4.57***	3.47**
d	1.05	.59	.45	.55	.45
n	398	133	104	69	59
Discharge					
t		−4.79***	−5.21***	−2.05*	−3.56***
d		.42	.51	.25	.46
n		133	104	69	59
3 months					
t			−1.83	−.96	−.30
d			.22	.13	.05
n			71	51	37
6 months					
t				.71	−.07
d				.11	.01
n				45	38
9 months					
t					−1.94
d					.32
n					38

d indicates effect size; *n*, number included in comparison; *t*, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

Treatment Outcomes

Means and SDs for all outcome measures at each time point are reported in Table 2. *T* test comparisons with effect sizes for each measure and time point are reported in Tables 3 to 8.

Immediate Treatment Gains. Results indicated that patients endorsed improvement across all outcome measures when comparing admission to discharge scores. Average pain intensity ratings decreased from 6.14 ± 1.62 to 4.42 ± 1.77. Pain-related life interference decreased from 66.28 ± 5.06 to 59.31 ± 6.13. There were also statistically significant decreases in depressed mood (60.32 ± 8.81 to 53.11 ± 8.71) and anxiety (61.27 ± 9.23 to 55.88 ± 8.58). Physical functioning scores improved significantly from 35.53 ± 5.07 at admission to 40.77 ± 6.02 at discharge. Finally, pain catastrophizing reduced from 21.53 ± 11.73 to 10.81 ± 8.68.

Longer-Term Outcomes. Data were analyzed comparing admission to follow-up scores. Across outcome measures, results demonstrated statistically significant improvements when comparing admission scores to each follow-up time point (3, 6, 9, and 12 months post-treatment).

For pain intensity ratings, patients indicated statistically significant reductions from admission scores of 6.14 ± 1.62 to 4.74 ± 2.26 at 3 months post-treatment, 5.14 ± 2.25 at 6 months, 4.42 ± 2.57 at 9 months, and 4.75 ± 2.12 at 12 months post-treatment. Similarly, pain interference scores were significantly reduced from 66.28 ± 5.06 at admission to 60.73 ± 8.26 at 3 months, 61.21 ± 7.70 at 6 months, 59.05 ± 9.15 at 9 months, and 59.23 ± 9.22 at 12 months. Depressed mood scores reduced from 60.32 ± 8.81 at intake to 52.52 ± 8.39 at 3 months, 54.45 ± 8.82 at 6 months, 53.44 ± 9.82 at 9 months, and 51.79 ± 8.47 at 12 months. Anxiety scores reduced from 61.27 ± 9.23 at admission to 53.66 ± 8.93 at 3 months, 54.89 ± 8.80 at 6 months, 52.52 ± 10.08 at 9 months, and 51.61 ± 8.81 at 12 months. Physical function scores significantly increased from program admission (21.53 ± 5.07) to 3 months post-treatment (38.92 ± 6.15), 6 months (40.05 ± 6.19), 9 months (40.89 ± 7.57), and 12 months post-treatment (40.69 ± 8.73). Finally, results indicated statistically significant decreases in pain catastrophizing scores, from 21.53 ± 11.73 at admission to 10.24 ± 10.67 at 3 months, 10.74 ± 10.63 at 6 months, 8.94 ± 10.91 at 9 months, and 9.07 ± 8.80 at 12 months post-treatment.

Deterioration of Treatment Gains. Data were analyzed to compare discharge scores to each follow-up time point to assess deterioration of treatment gains. Although results indicated that all outcome measures were improved compared with program admission, results also suggested some deterioration of treatment outcomes post-treatment. Results indicated that compared with discharge, average pain ratings increased from 4.42 ± 1.77 to 4.74 ± 2.26 at 3 months, 5.14 ± 2.25 at 6 months, 4.42 ± 2.57 at 9 months, and 4.75 ± 2.12 at 12 months. These data suggest that pain

TABLE 2. Means and SDs for Outcome Measures By Time Point

	Intake	Discharge	3 months	6 months	9 months	12 months
N	398	398	138	107	70	62
Pain ratings	6.14 (1.62)	4.42 (1.77)	4.74 (2.26)	5.14 (2.25)	4.42 (2.57)	4.75 (2.12)
Pain interference	66.28 (5.06)	59.31 (6.13)	60.73 (8.26)	61.21 (7.70)	59.05 (9.15)	59.23 (9.22)
Depression	60.32 (8.81)	53.11 (8.71)	52.52 (8.39)	54.42 (8.82)	53.44 (9.82)	51.79 (8.47)
Anxiety	61.27 (9.23)	55.88 (8.58)	53.66 (8.93)	54.89 (8.80)	52.52 (10.08)	51.61 (8.81)
Physical functioning	35.53 (5.07)	40.77 (6.02)	38.92 (6.15)	40.05 (6.19)	40.89 (7.57)	40.69 (8.73)
Pain catastrophizing	21.53 (11.73)	10.81 (8.68)	10.24 (10.67)	10.74 (10.63)	8.94 (10.91)	9.07 (8.80)

TABLE 4. Comparison of Pain Interference Scores By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	22.66***	7.73***	6.62***	7.82***	6.53***
d	1.14	.66	.64	.93	.83
n	397	138	107	70	62
Discharge					
t		−3.46***	−3.46***	−.44	−.17
d		.29	.33	.05	.02
n		138	107	70	62
3 months					
t			.31	.65	2.57*
d			.04	.09	.40
n			75	53	41
6 months					
t				.70	2.28*
d				.10	.36
n				46	40
9 months					
t					.43
d					.07
n					40

d indicates effect size; *n*, number included in comparison; *t*, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

TABLE 6. Comparison of Anxiety Scores By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	12.84***	9.04***	6.19***	6.10***	5.92***
d	.64	.78	.60	.73	.78
n	397	135	105	70	58
Discharge					
t		2.10*	.30	2.28*	2.67*
d		.18	.03	.27	.35
n		135	105	70	58
3 months					
t			−1.31	−.69	.54
d			.15	.09	.09
n			73	52	37
6 months					
t				.23	3.10**
d				.03	.50
n				46	38
9 months					
t					.39
d					.06
n					38

d indicates effect size; *n*, number included in comparison; *t*, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

severity ratings increased at follow-up time points compared with discharge, although they remained significantly lower than those at program admission.

Results demonstrated an increase in pain-related life interference when comparing discharge (59.31 ± 6.13) to 3 months (60.73 ± 8.26) and 6 months (61.21 ± 7.70) post-treatment. There were no differences between discharge and 9 or 12 months post-treatment, respectively. Overall, there was some deterioration of treatment effect when comparing discharge to initial follow-up time points (3 and 6 mo), but not when comparing discharge to longer follow-up time points (9 and 12 mo), suggesting that deterioration of treatment gains stabilized after 6 months.

With regard to depression, there was an increase in scores comparing discharge (53.11 ± 8.71) to 6 months (54.42 ± 8.82), but no statistically significant differences between discharge scores and other follow-up time points. This suggests that there was only deterioration of treatment gains when comparing discharge to 6 months post-treatment.

Results indicated increased anxiety from discharge (55.88 ± 8.58) to 3 months (53.66 ± 8.93), 9 months (52.52 ± 10.08), and 12 months (51.61 ± 8.81) post-treatment. There were no statistically significant differences between discharge scores and 6 months post-treatment. Overall, there was a deterioration of treatment outcomes for

TABLE 5. Comparison of Depression Scores By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	16.96***	9.28***	6.94***	5.23***	5.37***
d	.85	.80	.68	.63	.70
n	397	135	105	70	58
Discharge		−.67	−3.12**	−.84	.32
t		.06	.31	.10	.04
d		135	105	70	58
n					
3 months			−2.55*	−1.06	−.32
t			.30	.15	.05
d			73	52	37
n					
6 months				.30	2.56*
t				.04	.41
d				46	38
n					
9 months					.23
t					.04
d					38
n					

d indicates effect size; *n* = number included in comparison; *t*, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

TABLE 7. Comparison of Physical Functioning Scores By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	−19.59***	−7.70***	−6.68***	−4.53***	−4.30***
d	1.05	.68	.67	.59	.60
n	351	127	100	59	51
Discharge					
t		3.31**	3.23**	1.20	.79
d		.28	.31	.14	.10
n		136	106	70	59
3 months					
t			1.16	1.26	−.39
d			.14	.17	.06
n			73	52	38
6 months					
t				−.42	−.81
d				.06	.13
n				46	39
9 months					
t					−.29
d					.05
n					38

d indicates effect size; n, number included in comparison; t, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

anxiety when comparing discharge to most follow-up time points.

Physical functioning scores decreased from discharge (40.77 ± 6.02) to 3 months (38.92 ± 6.15) and 6 months (40.05 ± 6.19) post-treatment. There were no statistically significant differences between discharge and 9 and 12 months post-treatment. Finally, results indicated no deterioration in treatment gains for pain catastrophizing, as evidenced by no statistically significant differences between discharge scores and any follow-up time points.

TABLE 8. Comparison of Pain Catastrophizing Scores By Time Point

	Discharge	3 months	6 months	9 months	12 months
Intake					
t	20.53***	9.41***	8.65***	6.74***	6.39***
d	1.03	.81	.84	.53	.54
n	396	135	105	70	58
Discharge					
t		−.89	−.49	.50	.29
d		.08	.05	.06	.04
n		135	105	70	58
3 months					
t			−.19	−.09	.02
d			.02	.01	<.01
n			73	52	37
6 months					
t				−.08	<.01
d				.01	<.01
n				46	38
9 months					
t					−.78
d					.13
n					38

d indicates effect size; n, number included in comparison; t, *t* test.
*$P < .05$, **$P < .01$, ***$P < .001$.

Clinically Significant Change. The proportion of patients meeting MCID thresholds for clinically significant change is described in Table 9. Results indicate that the majority of patients reported clinically significant change compared with admission, with 84 to 93% of participants reporting improvement on at least 1 measure, 74% to 83% reporting improvement on at least 2 measures, and 55% to 71% reporting improvement on at least 3 measures at follow-up time points. Similar to the pattern of results described above, the proportion of participants reporting clinically significant changed declined at follow-up time points compared with discharge. However, the majority (55.1%) of patients still reported change on at least 3 measures at 12 months compared with program admission.

DISCUSSION

IPRPs have been shown to lead to improvement in pain and functioning immediately following treatment and in longitudinal follow-up studies. However, research has been limited, especially for longer-term outcomes of IPRPs utilizing different formats. The results of the current study demonstrate statistically and clinically significant improvement across all outcome measures (pain intensity, pain-related life interference, physical functioning, depressed mood, anxiety, and pain catastrophizing) when comparing intake to discharge scores. Results also indicate the durability of treatment outcomes over time, demonstrating improvement in all measures at follow-up time points compared with baseline. The majority of participants also reported clinically significant change on at least 3 measures at all time points compared with admission. The results of this study reinforce prior findings on the long-term effectiveness of IPRPs and extends them to a 10-week program model, which has not previously been documented in the literature. In addition, this study expands the research in this area by including a group of individuals with heterogeneous chronic pain conditions who were seen in a real-world clinical setting.

There was, however, some deterioration in treatment effect when comparing discharge to follow-up scores, particularly in the first 6 months post-treatment. This is similar to reports in prior studies (eg,[21] there are several possible explanations for this deterioration in effect). After graduating from an intensive program, participants may experience a reduction in support, structure, and accountability, impacting their symptoms and functioning. It is likely that adherence to the self-management regimen (eg, exercises or coping skills practice) decreases after completion of the program when patients are returning to their normal routines and environments and continues to decline over time. There may be additional psychosocial or environmental factors (eg, new stressors) or biological/medical factors (eg, illness, injury, and aging) that impact long-term outcomes. Future longitudinal research examining these post-treatment variables on outcomes would be a valuable contribution to the literature. Our data also suggest that some form of post-treatment support may be indicated to improve long-term outcomes (eg, follow-up visits, support groups, and digital applications). Future development and evaluation of these interventions is warranted.

Despite the strengths of this study, several limitations are worth highlighting. First, there was significant attrition across time points. Only 45% of patients completed a follow-up survey. Analyses indicated that those who did not

TABLE 9. Proportion of Participants Reporting Clinically Significant Change at Follow-Up Time Points Compared With Admission

	Discharge (%)	3 months (%)	6 months (%)	9 months (%)	12 months (%)
Pain ratings*	53.5	45.9	36.5	43.5	37.3
Pain interference	56.7	48.6	46.7	55.7	51.6
Depression	68.5	61.5	59.0	67.1	56.9
Anxiety	52.4	61.7	56.2	60.9	58.9
Physical functioning	52.3	42.4	40.0	37.9	43.1
Pain catastrophizing	71.5	71.1	70.5	67.1	56.9
≥1 measure†	92.6	89.3	89.0	86.0	83.7
≥2 measures	82.5	77.7	76.8	79.0	73.5
≥3 measures	70.9	67.8	63.5	66.7	55.1

*MCID thresholds for clinically significant change were as follows: pain ratings = 2 points, pain interference = 5.5 points, depression = 3.5 points, anxiety = 4.2 points, physical function = 4.2 points, pain catastrophizing = 4.5 points.

†Percent of patients who met or exceed number of MCID thresholds at time point.

complete follow-up surveys reported higher levels of baseline anxiety and higher discharge pain ratings. As a result, those who completed surveys may not have been representative of the larger group, introducing the possibility of selection bias and limiting generalizability of findings to the population. In addition, this study only included patients who completed the IPRP, which may not represent individuals with chronic pain who did not have access to, engage in or complete treatment. Our response rate of 45% is comparable to that reported in prior studies utilizing clinical samples, eg, 42%.[24] Future researchers could consider using professional research coordinators to follow up with patients postdischarge and/or providing incentives for completing surveys, which may result in a higher completion rate.

There are additional variables that could impact treatment outcomes or response rates that were not assessed in this study. Similar to other IPRP studies, there was no control group in this study and no assessment of treatment fidelity. We did not collect data on nonopioid pain medications or other medical treatments patients may have engaged in during or after the program, which could have impacted their outcomes. In addition, data were collected for patients who participated in the IPRP between 2019 and 2021, overlapping with the COVID-19 pandemic. We did not find that telehealth participation or engaging in the program before or after the start of the pandemic impacted admission to discharge treatment. However, this does not rule out the possibility of unknown factors related to the pandemic and ongoing pandemic-related disruption that could have impacted our findings.

We elected to use the longer 8-item PROMIS Short Form for anxiety and depression at program admission and discharge and the 4-item version for follow-up time points. While these measures assess the same domain and use the same scale (t-scores), the longer versions have greater measurement precision. As a result, there is the possibility of measurement error in using the 4-item versions. We weighed this risk against the reduced burden for participants in completing briefer forms of the measures. Next, analyzing our data by conducting multiple paired samples *t* tests increases the risk of type 1 error (false positive); as a result, we would recommend these data be replicated in future studies using larger sample sizes. Larger sample sizes would also allow for increased statistical power for follow-up time points, which had declining participation over time in this study.

In addition, participants in the current study were primarily White/Caucasian and female, limiting generalizability to other groups. The heterogeneous pain conditions included resulted in small sample sizes for specific pain sites; therefore, we were not able to compare results for specific pain populations in this study (eg, back pain vs. migraine/headache). Similarly, findings from a 10-week program may not generalize to other types of IPRPs. Further, comparing treatment participants to a non-treatment comparison group may help identify external variables (eg, psychosocial stressors), which may influence outcomes. While research supports the effectiveness of IPRPs, to our knowledge, there are no dismantling studies in this area, making it difficult to conclude which treatment components are beneficial.

While evidence highlights the efficacy of IPRPs, funding for these programs remains a significant barrier to widespread access. Insurance companies tend to provide higher reimbursement for treatments that are less expensive in the short-term, even though they may be more expensive in the long-term and result in less superior treatment outcomes.[30,52] This dynamic can restrict access to care, particularly for interdisciplinary programs, which tend to be more costly to operate. Over time, this threatens their long-term sustainability due to the need for diverse expertise, specialized training, and a collaborative infrastructure. These cost pressures not only limit availability but also contribute to the disproportionate impact that underserved populations experience related to receiving effective pain management services, eg,[53] this ultimately reinforces the reliance on passive, short-term interventions for pain management (eg, injections, medications, etc.) and keeps patients and providers embroiled in a costly cycle that undermines self-efficacy and engagement in care. Greater advocacy by pain experts is essential to increase awareness and understanding of chronic pain and its profound impact on human suffering. Change must occur across the spectrum, from systemic reforms to individualized care. We encourage health care professionals to assume public leadership roles, driving advancements in evidence-based research, shaping policy, enhancing education, and improving the quality of care.

In conclusion, the results of this study further support the longer-term benefits of IPRP participation and extend prior research to a 10-week program model with individual service delivery to a group of patients with heterogenous chronic pain conditions. Future research examining mechanisms of treatment outcomes, data on health care costs,

and with higher retention of participants for longitudinal outcomes would further add to the literature in this area.

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