FULL LENGTH MANUSCRIPT

Progress Toward Meaning-as-Goal and Its Association with Pain, Functioning, and Global Meaning and Purpose Among Veterans with Co-occurring Chronic Pain and PTSD

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Abstract

Background Co-occurring chronic pain and posttraumatic stress disorder (PTSD) is associated with poorer physical and mental functioning and well-being. Treatments often incorporate goal-setting around personally meaningful behaviors; however, it is unclear whether intentionally focusing on improving meaning and purpose in life (i.e., *meaning-as-goal*) may also serve as a helpful treatment target. The objective of the current study is to determine whether reported progress toward meaning-as-goal at 6 months is associated with pain severity and interference, physical and mental health functioning, and global meaning and purpose at 6- and 12-months.

Methods Data were collected as part of an evaluation effort focused on VA's Whole Health System implementation efforts. VA electronic health records were linked to survey data across three time points (baseline, 6 months, and 12 months) from Veterans with both chronic pain and PTSD across 18 VA sites. A total of 1341 Veterans met inclusion criteria (mean age = 62, SD = 11.7).

Results Regression analyses showed that progress toward meaning-as-goal was significantly associated with all 6-month variables, with standardized coefficients ranging from − 0.14 (pain severity and interference) to .37 (global meaning and purpose), in addition to all 12-month variables, with standardized coefficients ranging from − .13 (pain severity and interference) to .31 (global meaning and purpose).

Conclusions Efforts to intentionally promote meaning and purpose as part of evidence-based treatment for chronic pain and PTSD may lead to decreased pain and improved physical and mental health functioning and global meaning and purpose. With coefficients ranging from small to moderate effect sizes, more work is needed to better understand how best to maximize meaning-related goals.

Keywords Posttraumatic stress disorder · Chronic pain · Veterans · Meaning-making · Meaning in life · Goal-setting

Introduction

Co-occurring chronic pain and posttraumatic stress disorder (PTSD) affects up to 8% of Veterans overall [1, 2], could be as high as 50% among Veterans in specialty pain care [3, 4], and is associated with higher levels of pain severity, pain-related disability, depression, and healthcare utilization [5, 6]. Veterans are more likely than non-Veterans to experience PTSD if they have chronic pain [7], making this a particularly concerning issue for Veteran populations. Chronic pain is defined by the experience of pain for at least 3 months [8], while PTSD is characterized by experiencing a traumatic event and subsequent avoidance of traumatic stimuli, hypervigilance, intrusive experiences, and negative affect and cognitions for at least three months after the event [9]. Importantly, experiencing chronic pain or PTSD often results in the need to make meaning out of the pain or traumatic experience (i.e., meaning-making [10, 11]). However, experiencing chronic pain or PTSD can disrupt individuals' ability to engage in activities that promote a sense of meaning in life and meaning-making related to their pain or traumatic

experience. Recent calls from the US Surgeon General [12], and the National Academy of Medicine [13] have explicitly called for healthcare systems to treat the "Whole Person," a way of approaching care that focuses not only on disease management, but also on cultivating aspects of people's lives in which they find meaning, purpose, and value. Focusing on an individual's meaning and purpose in life is a critical component of a whole person approach, because treatment is guided by how an individual finds meaning in purpose [12, 13]. Indeed, research suggests that a sense of meaning and purpose may be an important transdiagnostic component of co-occurring chronic pain and PTSD [14]. Therefore, promoting goals that focus on the intentional pursuit of finding meaning in life may be an important way to enact change during therapy.

Cultivating a sense of meaning is an important component of healing from the chronic pain [14–17] and PTSD [18] experience. Current theory [19, 20] and empirical data[21] suggest that meaning in life is made of three sub-constructs: purpose (i.e., having a sense of purpose), mattering (i.e., believing that your life is significant), and coherence (i.e., believing that life events make sense and have a consistency to them). Meaning in life, particularly coherence [15], is associated with lower pain symptoms, and a recent meta-analysis showed a moderately negative association between meaning in life and PTSD symptoms [18]. Individuals find and maintain a sense of meaning through relationships, religious/spiritual activities, employment, hobbies, and other valued activities. Importantly, however, it is unknown as to whether self-perceived progress toward meaning-as-goal corresponds to levels of health and well-being, including overall (i.e., global) levels of meaning and purpose. Informing both these unknowns has clinical implications for Veterans with co-occurring chronic pain and PTSD. Cultivating more meaning in life as a formal goal in itself may provide a higher-order guidepost for individuals as they engage in meaningful activities. Goal-setting is already an integral part of cognitive-behavioral therapy for patients with chronic pain or PTSD [22–25] and is associated with better quality of life, emotional health, and self-efficacy [26]. "Specific, measurable, achievable, realistic, time-bound" (SMART) goals provide patients with a clear short-term plan. Because meaning in life is a potentially important transdiagnostic construct among individuals with chronic pain and PTSD, the meta-cognitive goal of finding more meaning in life, kept in mind during the pursuit of SMART goals, may serve as a powerful reminder of why individuals are in treatment and why they want to improve in ways that are important to them. Engaging in valued activities among patients with chronic pain is associated with improved physical and emotional health and reduced pain interference [27, 28]. However, to the best of our

knowledge, there is no research that examines whether goal-setting focused on the explicit cultivation of meaning in life may improve outcomes.

In sum, meaning in life and goal-setting play an important role among individuals with chronic pain and/or PTSD; therefore, focusing aspects of treatment on increasing meaning and purpose may be particularly beneficial for this population. The objective of the current study is to determine whether reported progress toward meaning-as-goal at 6-months is associated with pain severity and interference, physical health functioning, mental health functioning, and global meaning and purpose at 6- and 12-months. We hypothesized that greater progress toward meaning-as-goal would be associated with less pain severity and interference, greater physical and mental health functioning, and greater global meaning and purpose at 6-months and 12-months.

Methods

Participants and Procedure

Informed Consent The project generating these findings was conceived and conducted as a non-research operations activity conducted as part of a congressionally mandated internal operational assessment of VHA's Whole Health pilot program included in the CARA of 2016 (Public Law No:114–198). Informed consent was not necessary, as this evaluation was conducted as an operational evaluation.

Sample Cohort The current analysis leverages survey data collected as part of a larger quality improvement (QI) evaluation of VA Whole Health implementation and impacts collected at three separate time points (baseline, 6 months, and 12-months). We specifically focused on 1341 Veterans with co-occurring chronic pain and PTSD. Two phases of sampling were performed. Phase 1 began in March 2018, and selected patients < age 90 with a history of at least one outpatient encounter in the prior year and who had a condition associated with chronic musculoskeletal pain identified by ICD coding ($N = 12,701$ [29]). The sample was then expanded to include patients exposed to Whole Health services in a second phase which occurred from January to May 2019. Selected patients in the second phase had recently (within 28 days prior to sampling date) started utilizing Whole Health services (e.g., health coaching; see [6] for more information on how Whole Health is defined) identified with an encounter that was coded as representing a Whole Health encounter ($N = 7089$). We excluded patients who had any Whole Health use in the 90 days prior to this first Whole Health service. For this study,

the sample combining the first and second phases were used. Each patient's most recent primary care visit was identified as an index date for sampling. Patients were not included in the sample if they had an inpatient visit in the past 30 days or had a serious mental illness diagnosis in the prior year. Veterans were sent an introductory invitation letter followed by an initial survey (including a $5 gift card); nonrespondents were sent a reminder postcard and a second copy of the survey.

The current study focused on patients with co-occurring chronic pain and PTSD. A total of 8194 patients met criteria for chronic pain. Patients with chronic pain were identified in two ways: (1) using VA electronic health records, having at least two pain diagnoses (using ICD codes) 90 days apart or more during the year prior to receipt of the baseline survey and at least a 4 on the 11-point pain numeric rating scale (NRS) during the year prior to receipt of the baseline survey (NRS scores are routinely captured in VA) or (2) noting that they had experienced "ongoing pain that is a problem" for at least 3 months on the survey itself. In addition, Veterans must have indicated at least a 4 on the 11-point pain intensity (P), interference with enjoyment of life (E), and interference with general activity scale (G) (i.e., PEG [30]) assessed at baseline as part of the survey. A total of 2481 patients were identified as being diagnosed with PTSD, which was determined by having an ICD code consistent with PTSD in VA electronic health records during the year prior to receipt of the baseline survey. A total of 2250 Veterans met criteria for both chronic pain and PTSD. Out of these Veterans, 1341 indicated they had finding greater meaning and purpose in their life as a goal during the 6-month time point.

Measures

Outcomes Each outcome was assessed at baseline, 6-months, and 12-months. The PEG [30] uses three items (0 = low, 10 = high) to assess *pain severity and interference*. Scores are averaged and range from 0 to 10, with higher scores indicating more pain severity and interference. The PEG had good reliability at baseline ($\alpha = 0.86$), 6 months ($\alpha = 0.90$), and 12 months ($\alpha = 0.89$). *Physical and mental health functioning* was assessed using the Patient Reported Outcomes Measurement Information System-Physical Health and Mental Health (PROMIS-PH and PROMIS-MH) [31], respectively. Each scale contains four items that participants respond on a 5-point Likert scale (5 = "Excellent" to 1 = "Poor"). Raw scores are transformed into T-scores normed on a national sample, with 50 representing the population norm and 10 points being the standard deviation. Higher scores represent higher functioning (e.g., a score of 60 would be 1 SD better functioning than the general

population, whereas a score of 40 would be 1 SD worse). Physical health functioning at baseline ($\alpha = 0.63$), 6-months ($\alpha = 0.67$), and 12-months ($\alpha = 0.66$) had less than optimal reliability; however, mental health functioning at baseline ($\alpha = 0.82$), 6-months ($\alpha = 0.82$), and 12-months ($\alpha = 0.82$) had good reliability. Global meaning and purpose was assessed via a single-item from Diener et al.'s [32] Flourishing Scale: Participants were asked to indicate on a 7-point Likert-type scale ("Strongly agree," "Agree," "Slightly agree," "Neither agree nor Disagree," "Slightly disagree," "Disagree," "Strongly disagree") their agreement with the following statement: "I lead a purposeful and meaningful life." Scores were reverse scored so that higher scores indicated more global meaning and purpose.

Progress Toward Meaning-as-Goal Participants were provided a list of 22 personal health goals, one of which was "Find greater meaning and purpose in my life," which is the focus of the current study (i.e., *meaning-as-goal*) at each timepoint. For the current analyses, only the 6-month timepoint data were used for progress toward meaning-as-goal. Participants were asked to respond to the goal of finding meaning and purpose by "think[ing] back over the past 6 months. For each goal that is important to you, mark the box that shows how much progress you have made towards that goal." Participants responded to the goal in one of 7 ways: "N/A or not a goal at this time," "Getting worse," "Almost no progress," "A little progress," "Some progress," "A lot of progress," and "Goal reached or almost reached." We coded responses − 1 ("Getting worse") to 4 ("Goal reached or almost reached"). Higher scores indicated greater progress had been made toward that goal. Only participants who indicated that finding greater meaning and purpose in life was an important goal were included in the analyses (i.e., answered "Getting worse," "Almost no progress," "A little progress," "Some progress," "A lot of progress," or "Goal reached or almost reached" on the item).

Demographics Age, gender (male and female were the only options coded from Veterans' health record), rurality of patient's home address (determined via zip code), distance to the nearest primary care VA clinic, and body mass index were collected from VA EHR. Self-reported survey data was used for relationship status, education, whether they served in a combat zone, ethnicity, and race.

Health Characteristics Pain severity, as assessed by the Defense and Veterans Pain rating Scale (DVPRS) [33], and duration of problematic pain were self-reported in the survey. See Table 1 for all categories of self-report options for the duration of problematic pain. The DVPRS is a 1-item assessment that asks participants to rate their pain during the past 24-hours on a scale from 0 ("No pain") to 10 ("As bad

as it could be, nothing else matters"), which is then divided into four groups: "None" (0); "Mild" (1–4), "Moderate" (5–6), and "Severe" (7–10). VA EHR was used to determine count of chronic conditions (Elixhauser Index [34] which summed 31 conditions) and prior year depression and anxiety diagnoses (using ICD codes).

Data Analysis Strategy

Descriptive statistics (e.g., frequencies and means) were used to examine baseline sample characteristics. There was no viable way to numerically represent Veterans who marked progress toward meaning-as-goal as "N/A or not a goal at this time" without potentially introducing error into the analyses. As a result, only Veterans who indicated progress (or lack thereof)

toward meaning-as-goal at 6-months were included in the analyses. Correlations were used to determine first-order relationships between variables used in our model. Paired *t*-tests determined whether there were significant differences from baseline to 6-months and between 6- and 12 months for each outcome (pain severity and interference, physical and mental health functioning, and global meaning and purpose), and effect sizes (Cohen's *d*) were calculated for each difference. Regression analyses were used to test each hypothesis. Each regression model included baseline levels of pain severity and interference, physical and mental health functioning, and global meaning and purpose. We also adjusted for age, gender, depression diagnosis, anxiety diagnosis, pain chronicity, and count of chronic conditions in each model.

Table 1 Sample characteristics

	N = 1341		
Age, mean (SD)	62.3 (11.7)	Race, *n* (%)	
Female gender, *n* (%)	232 (17.3)	White	993 (74.0)
Relationship status, *n* (%)		Black or African American	210 (15.7)
Married/civil union	853 (63.6)	Asian	2 (0.1)
Engaged or in a relationship	62 (4.6)	Native Hawaiian or Other Pacific Islander	3 (0.2)
Single	76 (5.7)	American Indian or Alaska Native	24 (1.8)
Separated	32 (2.4)	Missing	109 (8.1)
Divorced	247 (18.4)	Chronic pain, *n* (%)	973 (72.6)
Widowed	53 (4.0)	Defense and Veterans Pain Rating Scale, *n* (%)	
Missing	18 (1.3)	None	2 (0.1)
Education, *n* (%)		Mild	119 (8.9)
8th grade or less	17 (1.3)	Moderate	563 (42.0)
Some high school, not graduate	42 (3.1)	Severe	644 (48.0)
High school graduate or GED	295 (22.0)	Missing	13 (1.0)
Some college or 2-year degree	589 (43.9)	Duration of problematic pain, *n* (%)	
4-year college graduate	192 (14.3)	Less than a month	1 (0.1)
More than 4-year college degree	199 (14.8)	1–3 months	4 (0.3)
Missing	7 (0.5)	3–6 Months	10 (0.7)
Urban/metro, *n* (%)		6 months to 1 year	42 (3.1)
Yes	999 (74.5)	1–5 years	197 (14.7)
Missing	1 (0.1)	More than 5 years	1069 (79.7)
Miles to the nearest primary care VA clinic	16.6 (16.0)	Missing	18 (1.3)
Combat zone, *n* (%)		Body mass index, *n* (%)	31.8 (6.3)
Yes	985 (73.5)	Count of chronic conditions, *m* (SD)	3.2 (1.9)
Missing	14 (1.0)	Depression diagnosis, *n* (%)	697 (52.0)
Hispanic or Latino/a, *n* (%)		Anxiety diagnosis, *n* (%)	399 (29.8)
Yes	109 (8.1)		
Missing	23 (1.7)		

SD standard deviation

Results

Sample Characteristics

Table 1 summarizes the sample characteristics. Participants had an average age of 62.3 years (SD = 11.7); 17.3% were women; 74% were White; and 64% were married. The most frequent education category was some college or 2-year degree (44%), with other education levels ranging from 8th grade or less (1%) to more than a 4-year college degree (15%). Nearly 3 in 4 participants had experienced combat (74%). Most participants had either moderate (42%) or severe pain (48%) on the DVPRS, and 80% had experienced chronic pain for more than 5 years. In addition to meeting criteria for chronic pain and PTSD, over half of participants had a past-year depression diagnosis (52%), and nearly 1 in 3 had a past-year anxiety diagnosis (30%).

Table 2 summarizes the means and SDs of outcome variables at baseline, 6-months, and 12-months. Table 3 includes all correlations between model variables. At baseline, the sample had severe pain (mean score of 7.3 on 0 to 10 PEG pain scale), in addition to physical and mental health 1.5 SD worse than the population norm (T-scores of 34.8 and 35.4, respectively). Global meaning and purpose was slightly below the "Neither agree nor Disagree" category at baseline (M = 3.9, SD = 1.7).

Changes in Variables Over Time

Table 4 includes estimates, 95% CI, and p-values of changes over time for the four study outcomes, with Veterans significantly improving from baseline to 6-months on pain, physical health functioning, and mental health functioning, but not global meaning and purpose. From 6- to 12-months, Veterans significantly improved on mental health functioning and global meaning and purpose, but not pain or physical health functioning. Pain scores remained high at each time point, with the highest scores at baseline ($M = 7.31$, $SD = 1.5$). Veterans were nearly 1.5 SDs below national norms on mental health and physical health functioning at all time points. While global meaning and purpose was slightly below the "Neither agree nor Disagree" category at baseline ($M = 3.87$, $SD = 1.68$) and 6-months ($M = 3.91$, $SD = 1.67$), scores increased to above the "Neither agree nor Disagree" category at 12-months ($M = 4.43$, $SD = 1.63$).

Effect sizes (Cohen's d) of improvement across the outcomes between baseline and 6-months ranged from 0.03 (global meaning and purpose) to 0.18 (pain severity and interference). Effect sizes of improvement across the outcomes between 6-months and 12-months ranged from 0.03 (physical health functioning) to 0.32 (global meaning and purpose).

Progress Toward Meaning-as-Goal and Its Association with 6- and 12-Month Outcomes

Table 5 includes regression model estimates of progress toward meaning-as-goal and associated outcomes. Progress toward meaning-as-goal was significantly associated with all 6-month outcomes: pain severity and interference ($b = -0.19$, 95% CI -0.26, -0.12; standardized beta $= -0.14$), physical health functioning ($b = 0.91$, 95% CI 0.69, 1.13; standardized beta $= 0.20$), mental health functioning ($b = 1.71$, 95% CI 1.47, 1.95; standardized beta $= 0.30$), and global meaning and purpose ($b = 0.47$, 95% CI 0.40, 0.53; standardized beta $= 0.37$).

Progress toward meaning-as-goal was significantly associated with all 12-month outcomes: pain severity and interference ($b = -0.16$, 95% CI -0.24, -0.08; standardized beta $= -0.13$), physical health functioning ($b = 0.75$, 95% CI 0.49, 1.01; standardized beta $= 0.16$), mental health functioning ($b = 1.27$, 95% CI: 0.98, 1.56; standardized beta $= 0.22$), and global meaning and purpose ($b = 0.38$, 95% CI 0.31, 0.45; standardized beta $= 0.31$).

Table 2 Means and standard deviations of main regression variables

	Baseline	6 months	12 months
Progress toward meaning-as-goal		0.83 (1.34) $n = 1341$	
Pain severity and interference	7.31 (1.50) n = 1,341	7.02 (1.77) $n = 1334$	7.05 (1.73) $n = 1019$
Physical health functioning	34.75 (5.88) n = 1,310	35.37 (6.15) $n = 1303$	35.62 (6.15) $n = 995$
Mental health functioning	35.35 (7.67) n = 1,327	35.84 (7.70) $n = 1321$	36.81 (7.83) $n = 1020$
Global Meaning and purpose	3.87 (1.68) n = 1,334	3.91 (1.67) $n = 1339$	4.43 (1.63) $n = 1021$

Means (standard deviations) presented

Table 3 Correlations, means, and standard deviations of model variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Progress toward meaning-as-goal	-																	
2. PEG — BL	-.16	-																
3. PEG – 6M	-.24	.55	-															
4. PEG – 12M	-.22	.49	.56	-														
5. PH – BL	.32	-.59	-.48	-.40	-													
6. PH – 6M	.38	-.46	-.63	-.47	.69	-												
7. PH – 12M	.37	-.42	-.49	-.64	.66	.72	-											
8. MH—BL	.51	-.28	-.27	-.27	.55	.45	.44	-										
9. MH – 6M	.61	-.25	-.34	-.28	.45	.55	.47	.74	-									
10. MH – 12M	.55	-.25	-.31	-.34	.47	.52	.56	.73	.77	-								
11. Meaning—BL	.48	-.19	-.15	-.16	.35	.29	.30	.59	.52	.49	-							
12. Meaning – 6M	.58	-.14	-.17	-.19	.29	.34	.32	.51	.60	.53	.53	-						
13. Meaning – 12M	.56	-.17	-.21	-.25	.32	.36	.42	.52	.58	.65	.55	.62	-					
14. Age	.16	-.03	-.05	-.05	.08	.06*	.05	.23	.20	.20	.11	.12	.11	-				
15. Gender (female)	-.02	-.03	-.02	-.03	.01	.01	.04	-.03	-.05	-.02	-.06*	-.08	-.03	-.26	-			
16. Depression	-.17	.09	.08	.08*	-.12	-.11	-.11	-.21	-.22	-.19	-.16	-.14	-.17	-.06*	.12	-		
17. Anxiety	-.05	-.02	-.02	-.02	-.01	-.00	.00	-.14	-.13	-.07*	-.05	-.09	-.09	-.18	.10	.24	-	
18. Duration of pain&	-.05	.11	.16	.13	-.14	-.14	-.13	-.09	-.07	-.11	-.07	-.02	-.08	-.05*	-.02	.04	.01	-
19. No. cond	.04	.03	.04	-.03	-.13	-.11	-.11	.03	.00	.02	-.03	.00	.01	.28	-.07	.25	.00	-.02

BL baseline, *6M* 6-months, *12M* 12-months, *PH* physical health, *MH* mental health

Gender: 0 = male; 1 = female. Depression and anxiety: 0 = no past-year diagnosis; 1 = yes past-year diagnosis. &0 = less than 5 years with problematic pain; 1 = more than 5 years with problematic pain

*p ≤ .05. Bolded coefficients are significant at p ≤ .01

Table 4 Observed differences of outcomes

Outcome* (potential range of scores)	BL to 6 months Diff. [95% CI]	p	Effect size (Cohen's d)	6-months to 12-months Est. [95% CI]	p	Effect size (Cohen's d)
Pain severity and interference (0–10)	−.29 [−.37, −.20] (n=1334)	<.001	.18	.09 [−.01, .19] (n=1012)	.075	.06
Physical health functioning (0–100)	.65 [.39, .91] (n=1273)	<.001	.14	−.14 [−.43, .15] (n=966)	.346	.03
Mental health functioning (0–100)	.47 [.17, .78] (n=1307)	.002	.09	.57 [.24, .89] (n=1005)	.001	.11
Global meaning and purpose (1–7)	.05 [−.04, .13] (n=1332)	.277	.03	.47 [.38, .56] (n=1020)	<.001	.32

n=paired t-test sample size. *Higher scores=more pain severity and interference and higher levels of physical and mental health functioning and global meaning and purpose

Table 5 Regression model estimates of meaning-as-goal as independent variable

Outcomes	Std. Beta	Beta	95% CI	p-value
6 months				
Pain	−.14	−0.19	−0.26, −0.12	<0.001
Physical health functioning	.20	0.91	0.69, 1.13	<0.001
Mental health functioning	.30	1.71	1.47, 1.95	<0.001
Global meaning and purpose	.37	0.47	0.40, 0.53	<0.001
12 months				
Pain	−.13	−0.16	−0.24, −0.08	<0.001
Physical health functioning	.16	0.75	0.49, 1.01	<0.001
Mental health functioning	.22	1.27	0.98, 1.56	<0.001
Global meaning and purpose	.31	0.38	0.31, 0.45	<0.001

Std. standardized

Discussion

The current study provides evidence that the pursuit of meaning and purpose may serve as an important treatment target for Veterans with co-occurring chronic pain and PTSD. Making progress toward meaning-as-goal was significantly associated with pain severity and interference, physical and mental health functioning, and global meaning and purpose at 6- and 12-months. Nevertheless, associations ranged from small to medium effect sizes, suggesting that more work is needed to determine the degree to which targeting increased meaning in life in treatment results in important patient benefits. Important theoretical and clinical implications emerge from these results, while providing context to literature that focuses on goal-setting and valued activities, in addition to recent calls from the National Academy of Medicine [13] and the US Surgeon General [12] aimed at treating patients within more holistic systems of care.

Pursuing Meaning: An Overlooked Change Process

Cultivating a sense of meaning in life may be an important transdiagnostic treatment target for Veterans with co-occurring chronic pain and PTSD [14]. Making meaning of traumatic events has long been of clinical and research interest, resulting in different treatment modalities (e.g., cognitive processing therapy [24], numerous theoretical models (e.g., shattered assumptions or the cognitive model of PTSD [35, 36]), and a recent meta-analysis highlighting the strong relationship between meaning in life and PTSD symptoms [18]. Withdrawal from valued activities is an important maintenance and etiological factor in chronic pain; as patients engage in fewer activities, they experience less behaviorally rewarding stimuli, contributing to physical deconditioning and depression, which in turn contribute to further chronic pain. Interrupting this cycle involves, among other things, reconnecting with valued activities. Researchers are only beginning to explicitly consider how patients make meaning of their pain and its implications (e.g., [37]) and how pain may affect their sense of meaning in life. To the best of our knowledge, this study is the first that shows how pursuing meaning and purpose may improve outcomes.

There are several possibilities why associations only evidenced small to medium effect sizes. One, the current evaluation was a secondary data analysis, and we were not perfectly positioned to definitively determine whether focusing on meaning and purpose in life would be associated with improved outcomes. Efficacy trials focused on answering these questions would want to specifically target meaning and purpose, while also using a control group. Second, meta-analyses have shown that meaning in life is moderately associated with both anxiety and depression [38, 39]. Therefore, the moderate associations with mental health functioning and global meaning and purpose may accurately reflect the magnitude of these relationships. Similarly, the small to medium associations related to progress toward meaning-as-goal and the constructs we examined may accurately reflect the magnitude of those relationships. Third, increasing meaning in life may be one aspect of a larger complex puzzle that requires both increased meaning and more concrete

skills to help improve outcomes. Finally, meaning in life is a multi-faceted construct [20], and it may be that focusing on specific aspects of meaning in life may result in larger associations. Future research is needed to test these ideas.

The current study took place within the context of a national evaluation of VA's Whole Health System, a system of care designed to focus on "What matters to you?" as opposed to "What is the matter with you?" [40]. "Whole person" care [12, 13, 40] is meant to engage individuals in goal-setting and other activities that correspond to their sense of meaning and purpose and that are designed to improve health and well-being. Focusing intentionally on making progress toward meaning-as-goal may help serve this function. More research is needed to understand how meaning-as-goal could be optimized within systems of care more broadly.

Limitations and Future Directions

Although results are longitudinal, causality cannot be established. Results should be replicated within the context of a clinical trial to determine if making progress toward meaning-as-goal causally explains outcomes relevant to individuals with co-occurring chronic pain and PTSD. Our use of one-item assessments of progress toward meaning-as-goal and global meaning and purpose may reduce reliability. Moreover, global meaning and purpose may be a relatively stable construct [16], where change over time may be limited. Although we adjusted for potentially confounding variables, it is possible that other variables affected results. Sampling techniques were focused on Veterans who were actively involved in VA care, many of whom were involved in Whole Health care, which may have biased results and limited generalizability to only Veterans with pain, PTSD, and who are involved with VA care, or even Whole Health care. Indeed, future work should focus on whether VA Whole Heath promotes greater meaning and purpose among Veterans, thus improving outcomes. Another limitation was the binary assessment of gender, preventing representation of individuals who are transgender and who identify as non-binary. Because we were not able to viably represent Veterans in our analyses who marked progress toward meaning-as-goal as "N/A or not a goal at this time," we were not able to assess whether progress toward meaning-as-goal had similar associations with our outcomes of interest among Veterans who do not have this explicit goal. Finally, characterizing progress toward meaning-as-goal and global meaning and purpose as separate constructs has its limitations. While these constructs are similar, perceptions of improvement (in the current analysis, progress toward meaning-as-goal) may differ from one's actual improvement, even if actual improvement is self-reported (in the current

analysis case, global meaning, and purpose [41]). Moreover, measuring both self-perceived change and actual change is consistent with the current Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) [42]. Nevertheless, we acknowledge more research is needed to determine whether progress toward meaning-as-goal and global meaning and purpose, as they were assessed in the current manuscript, are truly distinct.

Conclusions

Progress toward meaning-as-goal is a potentially important transdiagnostic factor among Veterans with co-occurring chronic pain and PTSD. The current evaluation showed that making progress toward meaning-as-goal at 6 months was significantly associated with pain severity and interference, physical and mental health functioning, and global meaning and purpose at 6-months and 12-months, suggesting it may be an important treatment target, especially for mental health functioning and global meaning and purpose. Nevertheless, associations showed small to medium effect sizes, and causality cannot be established; therefore, more research is needed to determine whether meaning-as-goal should be a focus of care within this population. Results implicate the importance of pursuing meaning within interventions and systems of care. Future work should examine how care with a focus on meaning and purpose can be implemented to ensure the delivery of whole person health.

Data availability The data is not publicly available.

Declarations

Ethical Approval and Informed Consent The following statement is in the manuscript: "The project generating these findings was conceived and conducted as a non-research operations activity conducted as part of a congressionally mandated internal operational assessment of VHA's Whole Health pilot program included in the CARA of 2016 (Public Law No:114-198). Informed consent was not necessary, as this evaluation was conducted as an operational evaluation."

Conflict of Interests The authors declare no competing interests.

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