

Specific, Measurable, Action-Oriented, Realistic, and Timed Goals and the Personal Health Inventory in a Wellness Group for Veterans With GWI

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Background: Interventions based on the Veterans Health Administration's (VHA) Whole Health (WH) initiative may be beneficial for veterans with Gulf War Illness (GWI) through specific, measurable, action-oriented, realistic, and timed (SMART) goal setting and monitoring of perceived goal attainment with the Personal Health Inventory (PHI).

Objectives: This secondary analysis of 2 randomized controlled trials focused on (1) categorizing SMART goals set during a wellness intervention based on the VHA's WH approach to identify goals most relevant for veterans with GWI and chronic pain and (2) descriptively examining the PHI over a course of treatment to assess its preliminary sensitivity to change. Also, changes in PHI for those who engaged in the intervention in-person versus remotely were compared.

Subjects: Participants were 49 veterans with GWI and chronic pain who received a 12-week, 24-session group wellness intervention delivered in-person or remotely due to the COVID-19 pandemic.

Results: SMART goal themes mapped onto the 8 areas of self-care presented in the WH program's circle of health with high categorical adherence. Most participants set goals in categories for working the body, food and drink, and personal development. The wellness intervention was related to improvements in perceived goal attainment as measured by the PHI in both in-person and remote participants, which indicates that the PHI may be sensitive to change over time.

Conclusions: These preliminary findings set the stage for future research on wellness interventions for veterans with GWI and chronic pain and the measurement of whole-person outcomes.

Key Words: Whole Health, Gulf War illness, SMART goals, Personal Health Inventory

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Gulf War Illness (GWI) is a multisymptomatic, chronic condition that impacts ~25%–32% of US military personnel deployed to the 1991 Persian Gulf War.¹ GWI can pervasively limit the quality of life and activity engagement in veterans.² While there are currently no known GWI treatments, veterans with this illness may greatly benefit from holistic wellness interventions that simultaneously target psychological and physical symptomatology through the setting and monitoring of health-based goals.^{3–5}

The Veterans Health Administration (VHA) promotes a holistic and patient-driven treatment approach called Whole Health (WH).^{6–8} This approach encompasses evidence-based techniques, including positive psychology, motivational interviewing, and holistic care.⁷ The WH initiative focuses on simultaneously addressing multiple domains of functioning (eg, physical, social, and spiritual) relevant to health-sustaining practices in veterans.⁷ This initiative also guides veterans to work on their personal goals by offering wellness interventions to facilitate and support healthy behavior changes.^{7,9}

Employing goal setting in wellness interventions can help patients improve symptoms and quality of life.¹⁰ Furthermore, frequent goal setting is associated with greater use of goal-attainment strategies.¹¹ However, setting goals alone may not be enough to elicit meaningful change.¹² Instead, setting highly specified goals may be needed to increase behavior change.¹³ The identification of specific, measurable, action-oriented, realistic, and timed (SMART) goals is a widely used strategy to bolster goal attainment.^{14,15} SMART goals are frequently incorporated in psychosocial treatments to improve medical and psychological symptoms, and this approach is recognized as a gold standard for goal setting in health care.^{16,17}

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However, to our knowledge, no study has assessed the SMART goals identified by veterans receiving a wellness intervention based on the VHA's WH initiative. This important information can elucidate domains of most interest to veterans and inform methods for tailoring WH treatments.

In addition, the WH program uses the Personal Health Inventory (PHI) to measure veterans' perceptions of goal attainment.⁶ This inventory guides veterans to mindfully assess where they are and where they would like to be in relation to 8 areas of self-care within the WH Circle (ie, working the body; surroundings; personal development; food and drink; recharge; family, friends, and coworkers; spirit and soul; and power of the mind). The use of this tool within clinical settings demonstrates a shift toward a whole-person assessment for veterans seeking care within the VHA.¹⁸ However, the PHI has not been uniformly adopted within all VHA facilities, with providers citing lack of time as a barrier to use.¹⁸ Only one third of providers assessed believed that the PHI would lead to better patient health outcomes.¹⁸ Moreover, no study, to our knowledge, has evaluated its sensitivity to change.

The present study is a secondary analysis of data from one arm of 2 related randomized controlled trials (RCTs) comparing a wellness intervention based on the VHA's WH approach to Tai Chi for veterans with GWI and chronic pain.¹⁹ Our primary aim was to describe and categorize SMART goals set by veterans receiving the wellness intervention to better understand which WH domains are most pertinent to them. The secondary aim was to evaluate the utility of the PHI by examining whether scores changed over the 12-week intervention. The first trial was conducted in-person and participants in the second trial engaged remotely due to the COVID-19 pandemic. Thus, we compared changes in the PHI between in-person and remote participants to assess if the wellness intervention functioned differently across the 2 treatment delivery modes. We offer no a priori hypotheses about the PHI's sensitivity to change due to the novel nature of this aim; however, we expected there would be no differences between in-person and remote participants. Given that frequent goal setting may be linked to greater use of goal-attainment strategies,¹¹ we conducted exploratory analyses examining the correlation between the number of self-generated SMART goals and PHI change.

METHODS

Participants

Gulf War veterans were recruited across 2 separate but related RCTs comparing Tai Chi and wellness group interventions. Recruitment for the in-person trial took place between June 2017 and October 2019. Recruitment for the remote trial followed pandemic-related study closures and took place between October 2020 and April 2022. Procedures were approved by an Institutional Review Board.

For the in-person study, inclusion criteria were: (1) served in the 1991 Gulf War based on self-report during an

initial phone screen where veterans were asked about their deployment to the Gulf region between August 1990 and July 1991; (2) symptoms consistent with GWI as measured by yes-no questions reflecting diagnostic criteria administered during an initial phone screen;^{4,20} (3) musculoskeletal or joint pain of at least 6 months duration in addition to fatigue or cognitive complaints as evaluated by yes-no questions administered during an initial phone screen; (4) not planning to relocate in next 3 months; (5) able to speak and understand English; and (6) able to attend in-person group sessions at the scheduled time. Exclusion criteria were: (1) lacks the capacity to provide consent; (2) major medical, psychiatric, or neurological disorder or moderate or severe traumatic brain injury, which could interfere with the ability to engage in study interventions safely and appropriately; (3) change in psychotropic or pain medication during the past month; (4) regular current Tai Chi, mindfulness meditation, or yoga practice, defined as at least 3 hours per week for more than 3 months; (5) difficulty standing on feet for ~60 minutes; (6) exhibits disruptive, disrespectful, or threatening behavior; and (7) currently involved in another treatment study that might confound findings (eg, treatment for GWI or pain). All inclusion and exclusion criteria were assessed during an initial phone screen and then confirmed at the baseline assessment. The eligibility criteria for the remote study were the same as the in-person study with 2 exceptions: not planning to relocate and able to attend in-person group sessions were replaced with access to a home computer or tablet device as inclusion criteria, and evidence of falsifying data was added as an exclusion criterion. Details on eligibility criteria for the remote study were published elsewhere.¹⁹

This secondary analysis investigated data on SMART goals and the PHI gathered as part of the wellness intervention and was not addressed in Tai Chi. Of the 60 veterans randomized to the wellness intervention, 3 were excluded from analysis due to invalid baseline assessment data (ie, inconsistent response pattern, not completing surveys at the proper time point, and not returning surveys), and 8 dropped out before reporting any SMART goals. The resulting final sample consisted of 49 veterans. Table 1 presents the demographics of the final sample.

Measures

Personal Health Inventory (PHI).⁶ The 16-item PHI is a self-report measure that assesses participants' perceptions of goal attainment in the 8 areas of self-care within the WH circle: working the body; surroundings; personal development; food and drink; recharge; family, friends, and coworkers; spirit and soul; and power of the mind. Participants rate "where are you" and "where would you like to be" on a Likert scale from 1 (low) to 5 (high) in each area. The PHI was utilized to help Veterans assess areas of self-care that mattered most to them and to facilitate goal setting. It was administered twice: once near the start of the intervention (approximately week 2) and again toward the end (approximately week 11). Because

TABLE 1. Participant Demographics

Characteristic	Combined (N = 49)	In-person (n = 21)	Remote (n = 28)
Age mean (SD)	56.98 (7.61)	54.95 (8.14)	58.5 (6.95)
Gender N (%)			
Female	7 (14.29)	0 (0)	7 (25)
Male	42 (85.71)	21 (100)	21 (75)
Race N (%)			
White	28 (57.14)	12 (57.14)	16 (57.14)
Black	16 (32.65)	7 (33.33)	9 (32.14)
More than once race	2 (4.08)	1 (4.76)	1 (3.57)
Other*	3 (6.12)	1 (4.76)	2 (7.14)
Ethnicity N (%)			
Hispanic, Latino, or of Spanish origin	3 (6.12)	2 (9.52)	1 (3.57)
Not Hispanic, Latino, or of Spanish origin	43 (87.76)	17 (80.95)	26 (92.86)
Prefer not to answer	3 (6.12)	2 (9.52)	1 (3.57)
Education N (%)			
High school/GED	2 (4.08)	2 (9.52)	0 (0)
Trade/tech school	2 (4.08)	2 (9.52)	0 (0)
Some college	11 (22.45)	6 (28.57)	5 (17.86)
Associate degree	6 (12.24)	4 (19.05)	2 (7.14)
Bachelor's degree	18 (36.73)	4 (19.05)	14 (50)
Graduate school	10 (20.41)	3 (14.29)	7 (25)
Employment category N (%)			
Working full-time	17 (34.69)	6 (28.57)	11 (39.29)
Working part-time	10 (20.41)	5 (23.81)	5 (17.86)
Retired, not working	10 (20.41)	4 (19.05)	6 (21.43)
Not working†	10 (20.41)	6 (28.57)	4 (14.29)
Other‡	2 (4.08)	0 (0)	2 (7.14)
Marital/relationship status N (%)			
Married/in a committed relationship	36 (73.47)	13 (61.9)	23 (82.14)
Divorced/ separated	8 (16.33)	6 (28.57)	2 (7.14)
Single	3 (6.12)	1 (4.76)	2 (7.14)
Widowed	2 (4.08)	1 (4.76)	1 (3.57)

*Other includes 1 participant who self-categorized as Middle Eastern, 1 participant who self-categorized as “other,” and 1 participant who indicated they would prefer not to report their race.

†Not working includes participants who are not working due to disability (6), unemployed, looking for work (3), and volunteering only (1).

‡Other includes 1 participant who reported that they were self-employed and 1 participant who reported that they were employed but were not working at the time due to COVID-19.

PHI is primarily used as a clinical tool, its reliability and validity are not well established. It has been shown to possess face validity as primary care providers rated it as having utility in improving patients’ health outcomes.¹⁸ Cronbach alphas for the PHI were 0.81 at week 2 and 0.85 at week 11.

Wellness Intervention

Participants attended twenty-four 60-minute group sessions that met twice weekly for 12 weeks. Groups were facilitated by doctoral-level psychology staff and/or psychology trainees supervised by licensed and credentialed study staff.¹⁹ Each session included psychoeducation using

written materials, discussion, and brief videos on modules consistent with the VHA’s WH initiative⁶ and a brief mindfulness exercise. From approximately week 2 to week 11, participants provided self-generated weekly SMART goals and reported on their progress. The PHI was introduced at approximately week 2 to help participants learn about the 8 domains in the circle of health and then think about what types of goals they wanted to set. It was re-administered at approximately week 11 to help participants reflect on any changes they made. Participants were encouraged to set goals in any domain during treatment and were not restricted to a specific one. They were also allowed to develop new goals and/or continue to work on previous ones.

In-person participants submitted goals on paper once a week using a log collected at the end of sessions. Logs were then photocopied and returned to veterans at the second session of the week with instructor feedback on refining goals. Staff encouraged remote participants to record weekly goals on logs provided in the treatment manual. Goals were then recorded by staff via weekly phone calls. The primary difference between the in-person and remote wellness interventions was that more time was spent on goals for remote participants because they received phone calls reminding them to collect and document goals.

Procedure and Analyses

For the current study, goals were compiled into a secure database, and 2 independent raters categorized the goals set by participants across both the in-person and remote studies. Raters met to resolve discrepancies after categorizing ~10% of the goals. If agreement was not reached, then the larger study team was consulted to reconcile the discrepancy. The study team identified themes that mapped onto the 8 areas of self-care in the circle of health with high categorical adherence and added 2 new categories, “General” and “Insufficient Information,” to accommodate goals that did not fit into the circle-of-health domains (see Table 2 for the descriptions of the 10 goal categories).

Descriptive analyses were performed in Microsoft Excel and SPSS version 29. We computed the total and percentages for each goal by category as well as derived the average number of goals identified per category. Goals were summed across sessions from week 2 to week 11. If a participant set a goal in a given category and did not change the goal because they continued to work on it, then that goal was counted each week. For the PHI, we created a discrepancy score by subtracting “where are you” from “where would you like to be” for each domain across both timepoints. We compared mode of treatment delivery (in-person vs. remote) based on identified goals and PHI scores to evaluate if the wellness intervention functioned differently when delivered remotely.

To examine data iteratively and rigorously, we first conducted a series of χ^2 tests to assess differences by mode of treatment delivery in the total number of goals identified and the number of goals identified per category. Next,

TABLE 2. Description of Goal Categories

Food and drink	<p>“Nourishing and Fueling”—What we eat and drink can have a huge effect on how we experience life, both physically and mentally. Choose healthy eating habits that fit your lifestyle. A healthy diet can help prevent disease and promote healing, especially from chronic conditions such as arthritis, heart disease, diabetes, and depression. Learn which foods and drinks support your health and life goals. Keep your body and mind properly fueled and hydrated.</p> <p><i>We categorized mindful eating as Food and Drink.</i></p>
Personal development	<p>“Personal Life and Work Life”—Our health is impacted by how we spend our time. We feel best when we can do things that really matter to us or bring us joy. How do you spend your time and energy during the day? Do things give you energy or make you tired? Do you spend time doing what matters most to you? How do you feel about your finances, and how are they affecting your life? These factors affect not only your happiness but also your health.</p> <p><i>We also categorized general goal setting, making plans for pleasurable activities, seeking mental health treatment, and timeliness goals (eg, being on time) as Personal Development.</i></p>
Power of the mind	<p>“Relaxing and Healing”—Our thoughts are powerful and can affect our physical, mental, and emotional health. Changing our mindset can aid in healing and coping. Your mind can affect your body. Sometimes when you think about stressful things, your heart rate and blood pressure go up (without you even recognizing it). You can use the power of your mind to lower blood pressure or control pain. Learn to use the connection between your body, brain, and mind. Military Service members and athletes use the power of the mind to visualize a successful mission or event. Mind-body practices tap into the power of the mind to heal and cope and can help us advance what we want most in life.</p>
Working the body	<p>“Energy and Flexibility”—Our physical, mental, and emotional health are impacted by the amount and kind of movement we do. The activity gives you energy and strength. Movement can make you more flexible. Activity is also good for your mind. Regular activity can help with many issues affecting one’s health, for example it can help lower blood pressure and cholesterol and reduce the risk for heart disease. Examples of activity and movement include walking, gardening, dancing, chair yoga, or lifting weights. It’s important to find what works for you and your body.</p> <p><i>We also considered gardening as Working the Body. If a participant did not specify a physical activity as changing the environment, then it was categorized as Working the body (eg, “hiking” was categorized as Moving the Body, but “hiking in nature” was categorized as Surroundings).</i></p>
Family, friends, and coworkers	<p>“Relationships”—Our relationships, including those with pets, have as significant an effect on our physical and emotional health as any other factor associated with well-being. Feeling alone can sometimes make you get sick or keep you sick. Positive social relationships are healthy. Healthy relationships with a life partner, friends, neighbors, or coworkers can be a source of strength. It’s good to talk to people who care about you and listen to you.</p>
Recharge	<p>“Sleep and Refresh”—Our bodies and minds need rest to optimize our health. Recharging also involves activities that replenish your mental and physical energy.</p>
Spirit and soul	<p>“Growing and Connecting”—Connecting with something greater than ourselves may provide a sense of meaning and purpose, peace, or comfort. Spiritual connection can take many forms. When things are hard, where do you turn for strength and comfort? Some people turn to spiritual or religious faith. Some people find comfort in nature. Some connect with art, music, or prefer quiet time alone. Some want to help others. You may express this as a guide to living fully.</p> <p><i>In order for goals related to music or art to be categorized as spirit and soul, they had to be explicitly linked with a spiritual context, otherwise they were categorized as personal development.</i></p>
Surroundings	<p>“Physical and Emotional”—Surroundings include where we live, work, learn, play, and worship—both indoors and out. Safe, stable, and comfortable surroundings have a positive effect on our health. Your environment can affect your health. You may have issues with safety or things like clutter, noise, bad smells, poor lighting, or water quality. You may be able to change some of these factors, but you may not be able to change them all. It starts with paying attention to the influences of your environment on your life and health. Improve what you can for a safe, comfortable, and healthy space.</p> <p><i>In order for goals related to physical activity to be categorized as surroundings, they had to include a conscious choice to change the environment, such as deliberately doing an activity outside in nature for the sake of being outside (see Working the Body above).</i></p>
General	<p>Specified goals unrelated to any identified category above or can be categorized in more than one of the above categories. For example, weight loss goals with no method specified were categorized as General.</p>
Insufficient information	<p>Lack of information either due to lack of clarity of writing or unreadable text and therefore we were unable to categorize the goal or ascertain the meaning of the goal.</p>

Category descriptions for Working the Body, Surroundings, Personal Development, Food & Drink, Recharge, Family, Friends, & Coworkers, Spirit & Soul, and Power of the Mind are presented verbatim from the VHA Whole Health website.⁶ Text in italics describe clarification decisions we made to help categorize goals. We created General and Insufficient Information to categorize goals that did not fit into the 8 domains of the circle of health.

we used a series of 2 (delivery mode: in-person or remote) x 2 (time: week 2 and week 11) mixed ANOVAs to test for differences in PHI discrepancy scores over time by delivery mode. To further inspect changes in PHI discrepancy scores, we combined delivery conditions and conducted supplemental paired-sample *t* tests to determine which PHI items changed over time (ie, “where are you” or “where would you like to be”). We performed *t* tests on

change in participants’ ratings from week 2 to week 11 on “where are you” and “where would you like to be” separately and only for domains that exhibited significant main effects of time in ANOVAs to account for Type I error rates. We interpreted Cohen *d* and η_p^2 effect sizes using established cutoffs.^{21,22}

To examine a possible association between the number of goals identified and PHI change, we first cre-

ated a change score by subtracting participants' week 2 item ratings from their week 11 item ratings. If correlations for domains displayed significant main effects of time in ANOVAs, we then performed post hoc correlations to ascertain if the number of goals set in a specific circle-of-health domain was related to the change score for that domain. We determined the strength of correlation coefficients using established cutoffs.²³

RESULTS

SMART Goals

Table 3 presents the percentages of participants who set a goal in each category and the average number of goals set in each category. A series of χ^2 tests revealed that there were no differences between in-person versus remote participants in total number of goals identified and number of goals identified per category (P -values > 0.05). There were 1182 total goals set by participants, with an average of 24.12 goals set per participant. Of the total goals, 91.71% ($n = 1082$) were categorized within the 8 facets of the circle of health. In addition, 7.19% ($n = 85$) reflected a General category (eg, "To be healthy/healthy lifestyle"), and 1.10% ($n=13$) reflected an insufficient Information category (eg, "try harder to make things work"). Within the circle of health, most participants set goals in working the body (95.92%, $n=47$), food and drink (79.59%, $n=39$), and personal development (73.47%, $n=36$). Participants set goals in an average of 4.49 categories within the circle of health (excluding both the general and insufficient Information categories). The average number of goals set per participant in each category was 7.84 in working the body, 4.45 in food and drink, 2.90 in personal development, 2.37 in family, friends, and coworkers, 1.88 in power of the mind, 1.73 in general, 1.41 in surroundings, 1.02 in recharge, 0.27 in spirit and soul, and 0.27 in insufficient information.

TABLE 3. Percentage of Participants, Average Number of Goals, and Number of Participants per Category

Categories	Percentage of participants	Average no. goals	No. participants
Food and drink	79.59	4.45	39
Personal development	73.47	2.90	36
Power of the mind	51.02	1.88	25
Working the body	95.92	7.84	47
Family, friends, and coworkers	55.10	2.37	27
Recharge	40.82	1.02	20
Spirit and soul	8.16	0.27	4
Surroundings	44.90	1.41	22
General	44.90	1.73	22
Insufficient information	18.37	0.27	9

N=49.

According to a series of χ^2 tests, there were no differences between treatment delivery mode (in-person vs. remote) in total number of goals identified and number of goals identified per category (P -values > 0.05).

Personal Health Inventory

Initial ANOVAs indicated no significant time x delivery mode interactions across domains in the Circle of Health (P -values > 0.18 , η_p^2 range: 0.006–0.05), with 1 exception: a significant interaction for spirit and soul, $F_{1, 33}=8.70$, $P=0.006$, $\eta_p^2=0.21$. Inspection of estimated marginal means for PHI discrepancy scores in this domain revealed that in-person participants ($n=9$; week 2: $M=2.44$, $SE=0.34$; week 11: $M=0.78$, $SE=0.22$) reported a greater reduction over time than remote participants ($n=26$; week 2: $M=1.77$, $SE=0.20$; week 11: $M=1.27$, $SE=0.13$). Importantly, the main effects of time were significant in ANOVAs across all 8 domains (P -values < 0.015 , η_p^2 range: 0.16 to 0.48); the discrepancy between "where are you" and "where would you like to be" significantly decreased from weeks 2 to 11 (Table 4).

Given this pattern of results, we combined delivery conditions and conducted supplemental paired-sample t tests for all domains in the circle of health to refine interpretations of PHI discrepancy scores by examining which dimensions of the discrepancy changed over time (Table 5). Analyses revealed that scores on "where are you" significantly increased from week 2 to week 11 across all domains (P -values ≤ 0.008 , Cohen d range: -0.47 to -0.80). In contrast, scores on "where would you like to be" did not significantly change (P -values ≥ 0.14 , Cohen d range: -0.04 to -0.26). Therefore, changes in discrepancy scores from week 2 to week 11 can be attributed to participants improving in "where are you" on the PHI for each circle-of-health domain.

Exploratory Correlations

We then conducted exploratory correlations to evaluate whether the number of goals in each category of the circle of health was associated with change in "where are you" on the PHI from week 2 to week 11 in each category. We utilized "where are you" from the PHI because only this item changed over time (see above). The number of goals set in food and drink exhibited a significant positive correlation ($r=0.42$, $P=0.01$, $n=36$), indicating that more goals set in this category were moderately associated with improvements in "where are you" in the same category. All other correlations were not significant (P -values > 0.17).

DISCUSSION

This secondary analysis of 2 RCTs categorized SMART goals within the circle of health and descriptively analyzed PHI responses over time among veterans in a 12-week, 24-session wellness group intervention. No differences emerged between in-person and remote participants in total number of goals identified and number of goals identified per category. Broadly, results provide support that strategies used in the wellness intervention were effective at eliciting SMART goals. Most participants in the wellness intervention set goals in working the body, food and drink, and personal development. These domains may represent foci of health that are most germane to veterans with GWI and chronic pain. Veterans with GWI experience a multitude of symptoms that can

TABLE 4. Effects of Time Within ANOVAs on PHI Discrepancy Scores for Domains in Circle of Health

Domain	Estimated marginal mean (SE) at week 2	95% CI of estimated marginal mean at week 2	Estimated marginal mean (SE) at week 11	95% CI of estimated marginal mean at week 11	F	df ₁	df ₂	η _p ²
Working the body†	2.25 (0.15)	1.94–0.57	1.46 (0.14)	1.17–1.75	18.08	1	34	0.35***
Recharge†	2.46 (0.20)	2.05–0.88	1.72 (0.17)	1.38–2.07	14.38	1	34	0.30***
Food and drink†	1.61 (0.16)	1.29–0.93	1.14 (0.16)	0.81–1.46	12.02	1	34	0.26***
Personal development†	1.91 (0.22)	1.47–0.36	1.12 (0.18)	0.76–1.48	14.42	1	34	0.30***
Family, friends, and coworkers†	2.11 (0.18)	1.74–0.47	1.14 (0.18)	0.76–1.51	18.50	1	34	0.35***
Spirit and soul‡	2.11 (0.20)	1.70–0.5†1	1.02 (0.13)	0.76–1.29	30.02	1	33	0.48***
Surroundings†	1.58 (0.20)	1.18–0.†98	1.07 (0.19)	0.69–1.44	6.63	1	34	0.16*
Power of the mind†	2.31 (0.19)	1.91–0.70	1.43 (0.19)	1.05–1.81	28.20	1	34	0.45***

Discrepancy score created by subtracting “where are you” from “where would you like to be” on the PHI at each time point.

*P ≤ 0.05
 **P ≤ 0.01.
 ***P ≤ 0.001
 †n = 36.
 ‡n = 35.
 PHI indicates Personal Health Inventory.

exacerbate other health conditions (eg, obesity) and disrupt quality of life and thus establishing and achieving goals in these domains may help to manage the sequelae of GWI via engagement in meaningful health-promoting activities that are associated with greater well-being.^{24–26} Accordingly, self-sustaining skills learned during the wellness intervention may galvanize better health habits and self-care in the long term, especially for Working the body, food and drink, and personal development.

The PHI discrepancy score in spirit and soul reduced more over time among in-person versus remote participants. This finding may imply that in-person participants’ perceived goal attainment for spirit and soul improved more than remote participants, given the large effect size. However, this difference between conditions was unexpected and is likely due to the small sample size, especially for the in-person condition. Future research is needed to replicate this result.

TABLE 5. Paired-Samples t tests on PHI Items at Week 2 and Week 11 for Domains in the Circle of Health

Domain	Week 2 mean (SD)	Week 11 mean (SD)	Mean difference	95% CI of mean difference	t	df	Cohen d
PHI—Where are you?							
Working the body†	2.31 (0.79)	2.92 (0.81)	−0.61	−0.89 to −0.33	−4.38	35	−0.73***
Recharge†	2.11 (0.89)	2.67 (0.99)	−0.56	−0.88 to −0.23	−3.44	35	−0.57**
Food and drink†	3.00 (0.83)	3.44 (0.88)	−0.44	−0.69 to −0.20	−3.63	35	−0.61***
Personal development†	2.53 (0.94)	3.39 (0.96)	−0.86	−1.27 to −0.45	−4.23	35	−0.70***
Family, friends, and coworkers†	2.53 (0.91)	3.25 (1.02)	−0.72	−1.11 to −0.34	−3.81	35	−0.64***
Spirit and soul‡	2.66 (0.94)	3.31 (0.87)	−0.66	−0.99 to −0.32	−4.02	34	−0.68***
Surroundings†	3.00 (1.01)	3.53 (1.00)	−0.53	−0.91 to −0.14	−2.79	35	−0.47**
Power of the mind†	2.31 (0.95)	3.19 (1.06)	−0.89	−1.27 to −0.51	−4.78	35	−0.80***
PHI—Where would you like to be?							
Working the body†	4.58 (0.65)	4.44 (0.65)	0.14	−0.17 to 0.44	0.93	35	0.15
Recharge†	4.56 (0.56)	4.44 (0.61)	0.11	−0.11 to 0.34	1.00	35	0.17
Food & Drink†	4.61 (0.55)	4.64 (0.54)	−0.03	−0.26 to 0.21	−0.24	35	−0.04
Personal Development†	4.44 (0.73)	4.61 (0.49)	−0.17	−0.39 to 0.05	−1.53	35	−0.26
Family, friends, and coworkers†	4.64 (0.59)	4.44 (0.84)	0.19	−0.11 to 0.50	1.31	35	0.22
Spirit and soul‡	4.60 (0.60)	4.46 (0.61)	0.14	−0.15 to 0.43	1.00	34	0.17
Surroundings†	4.6†1 (0.60)	4.67‡ (0.48)	−0.06	−0.28 to 0.17	−0.50	35	−0.08
Power of the mind†	4.53 (0.51)	4.64 (0.54)	−0.11	−0.32 to 0.10	−1.07	35	−0.18

*P ≤ 0.05
 **P ≤ 0.01.
 ***P ≤ 0.001
 †n = 36.
 ‡n = 35.
 PHI indicates Personal Health Inventory.

When delivery conditions were combined, the PHI discrepancy score significantly decreased across all domains in the circle of health with consistently large effect sizes. Lower discrepancy scores at week 11 on the PHI demonstrates that the wellness intervention may improve perceived goal attainment across all domains. Specifically, “where are you” ratings increased over time with mostly medium-to-large effect sizes across domains except for a small effect size in surroundings. In comparison, “where would you like to be” did not meaningfully change. These results are expected insofar as perceptions of current goal attainment (ie, “where are you”) may be more likely to fluctuate in response to goal setting and engaging in goal-directed behaviors. Perceptions of ideal goal-based living (ie, “where would you like to be”) may remain static even with treatment.²⁷ Taken together, findings indicate that the PHI discrepancy score and “where are you” item may be sensitive to change during a wellness intervention, thereby preliminarily supporting the PHI’s utility as a measure of change in clinical and research settings.

The number of goals set in food and drink exhibited a moderate positive correlation with improvement in “where are you” for food and drink on the PHI during the intervention. This result is consistent with prior research indicating that diet quality can improve in patients who set diet-related SMART goals during a health coaching intervention.²⁸ As such, there is preliminary evidence supporting number of goals set for food and drink as a mechanism of change in wellness interventions. Future research involving a larger sample and advanced analyses is needed to test this notion. It may also be beneficial to investigate which specific dimensions of SMART goals (eg, specific, measurable, etc.) strongly enhance motivation for behavior change and/or predict longer-term treatment gains at follow-up time points.

The present study has several limitations, notably that it is preliminary, so results should be interpreted with caution. We anchored interpretations to effect sizes, but the small sample size might make effect size estimates unstable and imprecise. Thus, we refrained from making specific clinical inferences and instead emphasize the need for future research, especially investigating the psychometric properties of the PHI. Further, the small sample size limits the generalizability of findings, and further research with larger samples is needed to replicate and extend our findings. However, this investigation utilized a targeted recruitment strategy involving strict inclusion criteria for Veterans with GWI that may enhance internal validity. Given the participant demographics, findings are most generalizable to White male veterans with GWI and chronic pain. Finally, the PHI’s validity and reliability are currently not well established, which may have led to spurious results. Because the PHI is used across VHA settings as a clinical tool, additional studies are needed to establish the clinical and research utility of the PHI as an index of perceptions of goal attainment in health care settings.

To the best of our knowledge, this study was the first to examine: (1) SMART goals set by veterans receiving a wellness intervention based on the VHA’s WH initiative;

and (2) the utility of the PHI in a treatment context. Results provide evidence for the use of wellness interventions based on the WH initiative in VHA settings. They also highlight working the body, food and drink, and personal development as areas of particular relevance to veterans with GWI and chronic pain. We also found that the PHI was sensitive to change during the wellness intervention and thus should be investigated further as a holistic outcome measure. While results are considered preliminary, our findings set the stage for future research on the efficacy and optimization of wellness interventions for veterans.

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