Pain Physician 2011; 14:61-70 • ISSN 1533-3159

Original Research

Reliability and Validity of the Global Pain Scale with Chronic Pain Sufferers

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Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: None.

Manuscript received: 03/20/2010
Revised manuscript received: 10/18/2010
Accepted for publication: 11/22/2010

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Background: Many pain scales exist today; however, a comprehensive, easy-to-analyze test has yet to be available to evaluate a patient's pain and understand the sociocultural, cognitive, and affective factors contributing to a patient's overall pain experience. Many scales have attempted to create an all-encompassing pain assessment but remain incomplete in their assessment of pain and the contributing aspects of pain.

Objective: To present the Global Pain Scale (GPS) as an alternative to current pain assessments and evaluate the reliability and construct validity of the GPS.

Methods: Two hundred sixty-two undergraduates with chronic pain at a large midwestern university participated in this survey study. Participants reported in which of 14 specific body regions they have pain, the frequency of pain, and treatment history for their pain. Participants completed 4 scales— GPS, the West Haven Yale Scale (WHY), the Perceived Stress Scale (PSS), and the short form McGill (SF-MPQ) — in a randomized order.

Results: The GPS demonstrated high criterion validity and high construct validity (including both convergent and discriminant validity). The total GPS scale and each of the subscales were reliable. The total GPS score was significantly correlated with all other subscales, excluding those for which there is a theoretical reason for them to not be correlated with our participant population.

Limitations: A sample of college students was used, thus decreasing the generalizability of these findings to patients approximating our sample.

Conclusions: The GPS is a valid scale that is concise and easily interpreted. The GPS is a comprehensive assessment of pain evaluating pain, emotions, clinical outcomes, and daily activities. This may be a valuable tool for evaluation and treatment planning for interventional pain management physicians.

Key words: chronic pain, pain assessment comprehensive pain scale, pain scales

Pain Physician 2011; 14:61-70

In 1965, Melzack & Wall's (1) gate control theory of pain established the interaction of psychological and physiological factors in the pain process, effectively rendering the previously held biomedical model for conceptualizing pain inadequate. Today, the biopsychosocial model is the prevailing heuristic, which considers the dynamic ways that physiological, psychological, and social factors interact in a patient's experience of chronic pain (2). In addition to assessing the physiological aspects of pain (range of motion, regions of the body affected, systems affected, pathophysiology, temporal characteristics,

intensity, and onset), it has been well documented that concurrent psychological variables affecting pain perception must also be assessed (3). Three groups of psychological variables that contribute to a patient's experience of pain have been empirically validated: sociocultural factors (e.g., social learning mechanisms, operant learning mechanisms, and respondent learning mechanisms); cognitive factors (e.g., beliefs about pain, beliefs about controllability, self-efficacy, cognitive errors, and coping); and affective factors (e.g., depression, anxiety, and anger) (4).

Due to the multifaceted nature of pain, the development of a valid and reliable assessment of pain within the biopsychosocial model is a daunting task. Although there have been significant advances in the sophistication and psychometric integrity of pain assessment instruments in recent years, the accurate and efficient measurement of pain remains a challenge (1). Commonly used scales in practice for an efficient assessment of pain intensity are the Verbal Rating Scale (VRS), Visual Analog Scale (VAS), and Numerical Rating Scale (NRS). Mader et al (5) found that participants given the same stimulus of pain rated the severity of the pain differently. Additionally, variability was found in the same participants' pain responses on the VAS to the same level of stimulus presented at different times (5), suggesting VAS results might be difficult to rely on for the assessment of pain. Other more complex scales such as the short form McGill (SF-MPQ) and the West Haven-Yale (WHY) multidimensional pain inventory include affective and sensory descriptors associated with pain. The SF-MPQ and the WHY measure a patient's pain experience, others' reactions to the patient's pain, and activities of daily living (6,7). Although these scales offer a valuable integrative approach to pain assessment, the scales individually do not encompass all aspects of pain including sociocultural, cognitive, and affective factors. As a result, there remains a paucity of standardized outcome measures for clinicians or researchers to utilize that incorporates a unifying inclusive but still efficient measure (8,9).

A recent study by the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) found that, in addition to the importance of assessing pain relief and improvement in physical and emotional functioning, a comprehensive outcome measure must also consider changes in "fatigue, sleep, home and family care, social and recreational activities, interpersonal relationships, and sexual activities" (10). In 2005, IMMPACT recommended several core outcome measures to be used in clinical trials (11); however, few of these measures were designed specifically to evaluate the efficacy of pain management treatments, or were normed on a pain population (e.g., Beck Depression Inventory, Profile of Mood States, etc.). Casarett et el (12) found that in addition to the reduction of pain, patients commonly cited improvement in sleep and increased ability to function as meaningful clinical endpoints. Moreover, Robinson et al (13) found that patients considered decreased fatigue, distress, and interference as indicators of treatment success. A global assessment of pain that takes account of these outcomes would be highly useful in clinical trials to measure treatment efficacy as well as in practice evaluating each patient's clinical endpoints.

Pain and its effects are multidimensional. Although clinicians understand this, they also desire a single measurement to work with, which is why the simple NRS question "what is your pain on a scale of 1 to 10" is still the most-used scale in practice, despite its shortcomings. It measures pain intensity but lacks psychological variables proven to be part of the patient's pain experience (4) as well as clinical outcome measures and daily activities. Many pain medicine physicians resort to the NRS scale because the other currently available scales (i.e., WHY and SF-MPQ) are time-consuming and difficult to interpret. Although more detailed than the NRS, these scales are still incomplete in their assessment of pain.

This article describes the Global Pain Scale (GPS) (14) (www.paindoctor.com/global-pain-scale) and its psychometric properties. The GPS is a brief screening tool for physicians to use as a bedside assessment of baseline functioning, and as a repeated outcome measure for assessing change over time in both acute and chronic pain states. Rooted in the biopsychosocial model, the GPS assesses physical pain, affective effects of pain, specific clinical outcomes, and the degree to which the pain interferes with activities of daily living (ADLs). In assessing physical pain states, the GPS addresses the ceiling, floor, and average pain over the past week, as well as current pain state. In assessing the psychological impact of the pain on the patient, the GPS screens for depression, anxiety, fear, hopelessness, and energy level. The GPS explores several specific clinical outcomes, including the effect of pain on the patient's quality of sleep, comfort, medication consumption, mood, independence, energy, work interference, perceived control over pain, health care utilization, and satisfaction with health care received. Finally, the GPS assesses the patient's percep-

tion on how the pain affects their ability to complete the following ADLs: shopping, chores, exercise, bathing, dressing, social activities, mobility, stamina, driving, and sexual activity.

The GPS was designed to capture the multidimensionality of pain, but also to provide a single score that could be used to track changes (for example, as the result of a clinical intervention). As conceived here, the total score weighs the 4 subscales equally, and provides a single number between 0 and 100 to describe overall pain and its effects. In practice, this could allow clinicians to see the effects of interventions (for example, a procedure might not initially reduce pain per se, but increase mobility or reduce the need for medications – both clinically important outcomes that would not normally be measured in a pain assessment). The items were developed by Paul Lynch and Tory McJunkin, physicians who run a multi-disciplinary pain clinic in Arizona; Jonathan Woodhouse, a post-doctoral student with pain management experience, and Douglas Gentile, a developmental psychologist who helped with the psychometric properties of the scale. The scale was designed to provide answers to clinical questions, such as whether an intervention really makes a difference beyond a reduction in pain scores. This article presents the first reliability, construct validity, and criterion validity tests from a sample of adults reporting chronic pain.

Demonstrating criterion validity of a scale requires that it be compared to other valid scales. Two pain scales that have previously been validated for clinical work are the SF-MPQ and the WHY. High correlations between similar subscales would be evidence of validity for those scales, and lower correlations between dissimilar subscales would be evidence of discriminant validity. In addition, construct validity was measured by correlating the GPS with the Perceived Stress Scale, as high pain should predict higher life stress.

Methods

Participants and Design

Two-hundred sixty-two undergraduates at a large Midwestern university participated in this survey study; 59% were female (3% did not mark either male or female on the form so were listed as unknown), and age ranged between 18 and 24 (mean = 21). Participants were recruited from the Psychology Department's Research Participant Pool, consisting of students in introductory psychology courses who can choose from a variety of studies to participate in for partial course credit. This study did not have inclusion/exclusion rules, as the participants referred themselves into the study and they were not seen by a physician as part of this study. Instead, recruitment materials specifically targeted participants who had chronic pain. This recruitment strategy was largely successful, as 99% of participants indicated having some type of chronic pain on the Chronic Pain Scale, detailed below. All students who volunteered to participate in the study were included in the analyses. Ethnicity information was not gathered, but is likely to be representative of the university (approximately 85% Caucasian/white). The design was a correlational survey study to verify the reliability and validity of the GPS by having all participants complete the new pain scale with previously validated pain measures. Participants completed questionnaire packets that included the GPS and several other measures that would allow us to test the validity of the GPS. The study was approved by the Iowa State University Institutional Review Board in accordance with the Declaration of Helsinki and the American Psychological Association Ethical Principles and Code of Conduct.

Chronic Pain Information

Participants reported in which of 14 specific body regions they have pain (e.g., head, neck, back, wrist, etc.), the frequency of pain in each region, and whether they have ever been or are currently being treated for it. The survey also gathered demographic information.

Global Pain Scale (GPS)

The GPS includes 33 items related to participants' chronic pain experience (14). Participants indicated their responses on an eleven-point scale (from 0 to 10). There are 4 subscales: your pain, your feelings, clinical outcomes, and your activities. For the pain subscale, participants indicated the degree of pain felt currently along with their best, worst, and average pain during the last week, as well as whether they have felt less pain in the last week. All other items required participants to agree or disagree with the given statements along an 11-point Likert-type scale, anchored strongly disagree to strongly agree. The 11-point scale provides a midpoint, and is familiar to people who are often asked to make a judgment from 0 to 10. The feelings subscale asked participants how they felt in the past week for the following emotions: depressed, anxious, afraid, hopeless, exhausted, and terrified. The clinical outcomes subscale asked about thoughts and behaviors related to their treatment outcomes and included

items such as "During the past week I took fewer medications" and "During the past week I had more energy." The activities subscale asked about participants' ability to perform daily activities such as doing chores in the home and walking up or down stairs. The full scale is available at www.paindoctor.com/global-pain-scale (Fig.1).

West Haven-Yale Multidimensional Pain Inventory (WHY)

The WHY is a 54-item questionnaire, developed to measure the subjective experience of chronic pain to help clinicians better assess treatment outcomes (7). It includes 3 sections, including one on pain experience (e.g., "On the average, how severe has your pain been during the last week"), significant others' behavioral responses to a patient's pain (e.g., "Asks me what he/she can do to help," "Expresses anger at me"), and the frequency of daily activities (e.g., "mow the lawn," "go out to eat"). The scale includes 12 subscales; the Cronbach alpha reliability coefficient for each subscale is reported in Table 1. Previous research with the WHY has found acceptable reliability, .7 - .9, and stability coefficients, .62 - .91 (7).

Short Form of the McGill Pain Questionnaire (SF-MPQ)

The SF-MPQ is a widely used pain measure (6). The short-form was developed for time efficient evaluation and includes 3 parts. The first part consists of sensory and affective adjectives for pain, such as "throbbing," that patients rate on a 4-point scale. The second part asks patients to check along a line for their present pain intensity, and the third part is an overall pain intensity scale (there was an error in the administration of this last subscale in the current study, rendering it unusable, which was not a critical problem, given that we had their summary pain measured in the WHY scale). The current study found a Cronbach's alpha of .74 for the sensory pain scale and .62 for the affective pain scale. Research assessing the SF-MPQ has found adequate test-retest reliability, .62 - .93, and responsiveness to change, standardized response mean > .80, for patients with musculoskeletal and rheumatic pain (15).

Table 1. *Internal Reliability for the WHY*

	Reliability	
Subscale	Current Study	Kerns, Turk, & Rudy
Interference	.882	.90
Support	.813	.83
Pain Severity	.798	.72
Self-Control	.645	.79
Negative Mood	.724	.73
Punishing Responses	.816	.84
Solicitous Responses	.806	.78
Distracting Responses	.660	.74
Household Chores	.824	.86
Outdoor Work	.728	.77
Activities Away from Home	.615	.70
Social Activities	.517	.74

Perceived Stress Scale (PSS)

The PSS is a 14-item measure of current perceived stress level (8). Patients rate on a 5-point scale from "Never" to "Very Often" the frequency they felt or thought a particular way in the past month. Items include "How often have you felt that you were unable to control the important things in your life" and "How often have you felt nervous and 'stressed'." The PSS has a published internal reliability of .84, and a test-retest reliability of .85 over 2 days and .55 over 6 weeks (8). The current study yielded an internal reliability of .86.

Procedure

After completing the informed consent, participants were given the Chronic Pain Information sheet and asked to keep the pain they indicated in mind for the subsequent scales. Participants completed the other scales (GPS, WHY, PSS, and SF-MPQ) in a randomized order. After completing all scales, participants were debriefed and thanked for their time.

Results

Demographics

Participants were asked about chronic pain in 14 body regions. Participants reported having pain in an average of 3.5 (SD = 1.8) body regions, with a range of zero (5 participants) to 9 (one participant). The most reported regions included lower back (57%), head (47%), knee (39%), neck (36%), shoulder (31%), and upper back (28%). Most (82%) reported having received medical treatment for the pain in the past, and 32% were currently being treated. Only 17% reported having never been treated for their pain.

INSTRUCTIONS: For each question, please circle the number that best represents your answer. If a question does not apply to you, please leave that item blank. Please note that some questions ask you about right now, and some ask you to answer for the past week.

YOUR PAIN: (Please indicate your level of pain by circling a number from 0 to 10)

My current pain is	No pain:	0	1	2	3	4	5	6	7	8	9	10 :Extreme pain
During the past week, the best my pain has been is	No pain:	0	1	2	3	4	5	6	7	8	9	10 :Extreme pain
During the past week, the worst my pain has been is	No pain:	0	1	2	3	4	5	6	7	8	9	10 :Extreme pain
During the past week, my average pain has been	No pain:	0	1	2	3	4	5	6	7	8	9	10 :Extreme pain

YOUR FEELINGS: (Indicate your agreement or disagreement with each statement by circling a number from 0 to 10)

During the past week, I have felt less pain	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
During the past week, I have felt:												
Depressed	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Anxious	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Afraid	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Hopeless	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Exhausted	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Terrified	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree

CLINICAL OUTCOMES: (Indicate your agreement or disagreement with each statement by circling a number from 0 to 10)

During the past week, I had trouble sleeping	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I had trouble feeling comfortable	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I took fewer medications	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
My overall mood improved	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I was more independent	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I had more energy	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I was able to do my work	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I had more control over my pain	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I needed to see the doctor less often	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
I was satisfied with my medical care	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree

YOUR ACTIVITIES: (Indicate your agreement or disagreement with each statement by circling a number from 0 to 10)

I am currently unable to:												
Go to the store	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Do chores in my home	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Exercise	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Bathe and dress myself	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Enjoy my friends and family	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Spend time outside	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Walk up or down stairs	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Bend over to pick things up	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Stand as long as I want to be able to	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Walk as far as I want to be able to	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Drive	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree
Comfortably enjoy sex	Strongly Disagree:	0	1	2	3	4	5	6	7	8	9	10 :Strongly Agree

Fig. 1. *Global Pain Scale (Lynch PJ, Woodhouse J, Gentile DA. 2005) Available at www.paindoctor.com/global-pain-scale*

Internal Reliability of the GPS

The total GPS scale was reliable (Cronbach alpha = .89), as were each of the subscales ('Your Pain' = .87, 'Your Feelings' = .84, 'Clinical Outcomes' = .72, and 'Your Activities' = .96). Confirmatory factor analyses were conducted to verify that the items fit within their intended subscales. Three subscales had all factor loadings over .400 (ranges for each subscale: Pain = .790 to .946, Feelings = .629 to .814, Clinical Outcomes = .239 to .736, and Activities = .697 to .913). The hypothesized 4-factor structure thus appears to be appropriate, with the possible exception of the Clinical Outcomes factor. The Clinical Outcomes factor includes 11 statements about potentially clinically relevant issues in the previous week. Eight of the 11 had high factor loadings (over .400). This limitation will be discussed in more detail later.

Construct Validity of the GPS

Table 2 displays the inter-correlations among the GPS subscales and the total weighted score. Pain itself is significantly correlated with each of the other subscales, as it should if pain affects one's emotional state, activities, and clinical outcomes. Although the individual subscales are correlated, the correlations are in the small to moderate range, suggesting that they each have unique variance and are measuring separate constructs. These significant but moderate inter-correlations are an indication of construct validity of the subscales.

Criterion Validity of the GPS

Table 3 displays the correlations between the GPS and the SF-MPQ, the WHY, and the PSS. In general, the GPS scales correlate very well with the similar subscales of the SF-MPQ and the WHY (Table 3).

Table 2. *Intercorrelations among the subscales of the Global Pain Scale*

	Pain	Emotions	Clinical Outcomes	Activities
Pain				
Emotions	.23[c]			
Clinical Outcomes	.33[c]	.31[c]		
Activities	.22[c]	.19[b]	.10	
Total	.65[c]	.67[c]	.60[c]	.67[c]

Note: a $P < .05$, b $P < .01$, c $P < .001$

Table 3. *Correlations between the Global Pain Scale and the McGill and West Haven Pain Scales and the Perceived Stress Scale*

	Global Pain Scale Subscales				
	Pain	**Emotions**	**Clinical Outcomes**	**Activities**	**Total**
McGill Pain Questionnaire Subscales					
Present Pain Intensity	.65[c]	.17[b]	.29[c]	.14[a]	.45[c]
Sensory Pain	.41[c]	.14[a]	.12[a]	.07	.27[c]
Affective Pain	.25[c]	.29[c]	.16[b]	.13a	.31[c]
West Haven-Yale Subscales					
Pain Severity	.79[c]	.23[c]	.41[c]	.21[c]	.59[c]
Negative Mood	.31[c]	.67[c]	.37[c]	.09	.53[c]
Self-Control	-.18[b]	-.53[c]	-.31[c]	-.12+	-.43[c]
Interference	.54[c]	.32[c]	.33[c]	.29[c]	.55[c]
Household Chores	.08	-.03	.03	.00	.03
Outdoor Work	-.04	-.07	-.06	-.04	-.08
Activities away from home	-.03	-.13[a]	-.17[b]	-.07	-.19[b]
Social activities	-.09	-.19[b]	-.17[b]	-.07	-.19[b]
Support from spouse	.21[c]	.04	.08	.01	.12[+]
Perceived Stress Scale	.23[c]	.62[c]	.32[c]	.16[b]	.50[c]

Note: + $P < .10$,[a] $P < .05$,[b] $P < .01$,[c] $P < .001$

- The Pain subscale is significantly correlated with the present pain intensity (r = .65) and sensory pain (r = .41) scales of the SF-MPQ, and with the pain severity scale of the WHY (r = .79).
- The Emotions subscale is significantly correlated with the affective pain scale of the SF-MPQ (r = .29), the negative mood scale of the WHY (r = .67), and the PSS (r = .62). It also correlates with the self-control scale of the WHY (r = -.53), a 2-item scale of the sense of control over one's problems.
- The Clinical Outcomes scale is significantly correlated with the self control (r = -.31) and interference (r = .33) scales of the WHY. The interference scale includes items that we have conceptualized under both clinical outcomes (e.g., affects ability to work) and activities (e.g., affects ability to do household chores), and should theoretically correlate well with both GPS subscales.
- The Activities scale is correlated significantly with the interference (r = .29) scale of the WHY. It is not, however, correlated with the highly specific activity subscales of the WHY, such as the household chores, outdoor work, activities away from home, or social activities subscales. Although this appears to be a lack of validity for the GPS Activities scale, the low correlations are likely due to a lack of appropriateness of the WHY items for this sample. Most college students do not need to "help with house cleaning," "work on house repairs," "take a trip," or "go to the park or beach."

The pattern of results does not change if the sample is restricted to those participants who have sought treatment for their pain, suggesting perhaps a higher, clinically-relevant, level of pain (Tables 4 and 5).

Table 4. *Inter-correlations among the subscales of the Global Pain Scale (including only participants who have sought treatment for their chronic pain, N = 217)*

	Pain	Emotions	Clinical Outcomes	Activities
Pain				
Emotions	.20[b]			
Clinical Outcomes	.30[c]	.30[c]		
Activities	.21[b]	.15[a]	.02	
Total	.64[c]	.65[c]	.55[c]	.66[c]
Note: a $P < .05$, b $P < .01$, c $P < .001$				

Table 5. *Correlations between the Global Pain Scale and the McGill and West Haven Pain Scales and the Perceived Stress Scale (including only participants who have sought treatment for their chronic pain, N = 217)*

	Global Pain Scale Subscales				
	Pain	Emotions	Clinical Outcomes	Activities	Total
McGill Pain Questionnaire Subscales					
Present Pain Intensity	.66[c]	.14[a]	.28[c]	.14[+]	.45[c]
Sensory Pain	.39[c]	.11	.13[+]	.04	.24[c]
Affective Pain	.21[b]	.29[c]	.17[a]	.11	.30
West Haven-Yale Subscales					
Pain Severity	.77[c]	.20[b]	.40[c]	.17[c]	.57[c]
Negative Mood	.25[c]	.66[c]	.36[c]	.03	.49[c]
Self-Control	-.16[a]	-.51[c]	-.29[c]	-.09	-.40[c]
Interference	.49[c]	.27[c]	.29[c]	.25[c]	.50[c]
Household Chores	.10	-.03	.05	-.03	.03
Outdoor Work	-.02	-.09	-.02	-.05	-.08
Activities away from home	-.00	.-.13[+]	-.07	-.11	-.13[+]
Social activities	-.05	-.16[a]	-.12[+]	-.05	-.15[a]
Support from spouse	.22[c]	.02	.05	-.02	.09
Perceived Stress Scale	.16[a]	.59[c]	.27[c]	.10	.43[c]
Note: [+] $P < .10$, a $P < .05$, b $P < .01$, c $P < .001$					

Discussion

Overall, the pattern of results demonstrates high criterion validity and high construct validity (including both convergent and discriminant validity) for the GPS. In addition, the total GPS score was significantly correlated with all other subscales, except those for which there is a theoretical reason for them to not be correlated (e.g., lack of "chores" and spouses for most college students).

The practice of evidenced-based pain medicine can be one of the most daunting challenges for clinicians. Many pain physicians simply ask if the patient believes the strategy worked as opposed to using the traditional VRS or NRS 0-10 scale. Frequently, patients might report complete success of their treatment, but report a pain score only slightly different from their pre-treatment score. Due to the confrontation with this phenomenon repeatedly in practice, this might suggest a lack of sensitivity with the measurement as opposed to unreliable patient ratings or a lack of treatment efficacy. Indeed, research has shown extreme variability in different participants' perception of the same pain stimulus and variability in the same participants' pain response to the same stimulus given at different times (5).

In our experience, many pain physicians have expressed a desire for a simple, easy to use, easy to track, and easy to validate measure that reliably and consistently measures the core outcomes pain physicians are trying to effect (viz., decreased pain, decreased medication use, increased quality of life, and increased activity level), presumably resulting in happier, healthier patients. Although several pain measures exist, most physicians find them to be too long, too complex, or too myopic in scope, rendering them impractical and unhelpful in clinical practice. The GPS is an attempt to create a short, easy to use measure that is validated to measure the same outcomes as longer tests like the West Haven, but one that is much more applicable to a busy practice setting.

The results of this study show the GPS has high internal reliability, high criterion validity, and high construct validity. By using a 0-100 scale, the hope is to build from the existing heuristic of a 0-10 concept of pain, which should be an easy generalization for most practitioners. More importantly, the GPS includes 4 tests in one measure: Pain, Emotions, Clinical Outcomes, and Daily Activities. Each of these domains has been documented as important contributing variables affecting the clinical course of chronic pain. The 4 subscales of the GPS are those that practitioners track when starting a new intervention, whether it is a new medication, physical therapy, or a pain relieving procedure (injection, radiofrequency, vertebroplasty, neuromodulation technique, etc). The GPS offers a comprehensive measure that is easy to administer and interpret without the need for additional pain scales.

The GPS lends itself nicely to empirical tests, in that each of the subscales can be independently tracked and the numerical values themselves can be tested for statistical significance. We hypothesize that the GPS will be able to detect change even in the absence of change in NRS or VAS scores. Several interventional studies are in development to explore this.

With Medicare moving closer to adopting some version of pay-for-service medicine, a reliable demonstration of clinical outcomes is imperative to the future of pain medicine. The measures used to track treatments will become paramount as the mandate to document evidenced-based medicine becomes a reality. One in 6 Americans has chronic pain and treatment for them might depend on pain management outcomes assessments. With a standardized comprehensive tool to assess pain and treatment efficacy, physicians might reliably evaluate each patient's pain and appropriately modify their treatment plan based on the scale results. Determining if a certain pain-relieving intervention does or does not help might decrease health care expenditures and improve treatment care. Additionally, the use of a scale like the GPS in clinical trials to show multiple clinical endpoints is key to advancing evidence-based pain medicine.

As with all studies, this study has several limitations. This is a pilot study exploring the reliability, validity, and feasibility of the GPS. As practitioners gain experience using this measure, it is expected to evolve as many other tests have. Although the GPS is significantly shorter than most pain assessments, we feel it is more practical and uniquely targeted to therapeutic outcomes. We envision a shorter one-page GPS making it even more applicable for busy practitioners. Further development of a shorter GPS will be planned for the future. Second, a convenient sample of college students was used, and the generalizability of these findings is limited to patients approximating our sample. We are planning further tests in a chronic pain practice to see if the results generalize to clinical practice, especially among elderly patients. Although we envision the use of the GPS in clinical populations, further research will be needed to test its efficacy.

Of the 11 items in the Clinical Outcomes factor, 3 did not have high factor loadings: "During the past week, I had trouble sleeping," "…I had trouble feeling comfortable," and "…I took fewer medications." These appear to us to have face validity as clinically relevant outcomes. It is possible (indeed, likely) that clinical outcomes are not a single construct, given that different types of symptoms are likely to be associated with different types of chronic pain. Therefore, the lower (but still positive) factor loadings for these 3 items should not immediately suggest that this is not a reliable or important subscale. It is also likely that different populations of chronic pain patients would respond differently for these symptoms. For example, college students are probably less likely to be taking medications for their pain than older patients. That does not mean that asking about reduced medications is an inappropriate clinical outcome to measure when attempting to measure pain outcomes. It means simply that clinical outcomes are heterogeneous, as is indicated by the range of factor loadings. This issue is likely to be valid for other relevant pain populations, such as the elderly, for whom some activities are less relevant. Further research is needed to determine if the instrument should be modified depending on patient population or type of pain (i.e., acute or chronic).

Conclusion

Although there is no proof yet that the GPS will be a better predictor of clinical outcomes, the fact that it addresses clinical outcomes including usage of pain medications is likely to be of benefit to clinicians. Research with clinical populations is currently underway. In spite of these limitations, however, we believe that the GPS offers practitioners a test that they can begin using in their practices and certainly in studies of pain management treatments. We believe the GPS is an inclusive measure of pain and clinical outcomes and could be used as a standardized measure of treatment efficacy. The GPS also uniquely tracks clinical outcomes after a pain-relieving treatment has been initiated. The GPS can be administered to the patient in the waiting room and scored by the support staff, thus resulting in a robust assessment of pain in one numerical score that the physician can employ to formulate treatment plans. For research, the GPS can be used to measure pain scores and to follow pain treatment efficacy. The GPS is available free for physicians' use in their practices or research studies, at www.pain-doctor.com/global-pain-scale.

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