Goal Attainment Scaling in Outpatient Physical Therapy for Chronic Low Back Pain: Protocol for a Mixed Methods Study

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Abstract

Background: Patient engagement in decisions regarding their health care may lead to improved outcomes and improved adherence to treatment plans. While there are several options for involving patients in their health care, goal setting is a readily accessible method for physical therapists to increase the involvement of patients in health care decisions. Physical therapy goals are often generated by health care providers based on subjective information or standardized, fixed-item, patient-reported outcome measures. However, these outcome measures may not fully reveal the activity and participation limitations of individual patients. Goal attainment scaling (GAS) is a patient-centered approach that allows patients to set meaningful goals. While GAS has been shown to be reliable, valid, and sensitive to change in various populations, there is limited evidence in the United States on utilizing GAS in physical therapy for patients with chronic low back pain (LBP).

Objective: The purpose of this paper is to describe the protocol for a study to (1) develop a way to apply GAS procedures for physical therapists treating patients with chronic LBP in the United States and (2) test the feasibility of applying GAS procedures for chronic LBP in an outpatient physical therapy setting.

Methods: This study used a mixed methods design with 2 phases: qualitative and quantitative. The qualitative phase of the study employed focus groups of patients with chronic LBP to identify an inventory of goals that were important and measurable. A series of prompts was developed from this inventory to assist physical therapists in collaboratively establishing goals with patients in a clinical setting. The quantitative phase of the study pilot-tested the inventory developed in the qualitative phase in patients with chronic LBP to determine feasibility, reliability, validity, and responsiveness. We also plan to compare how well GAS reveals change over time relative to traditional, fixed-item, patient-reported measures.

Results: Phase 1 data collection was completed in June 2020, while data collection for phase 2 was performed between March 2021 and December 2021. We anticipate that this study will demonstrate that GAS can be implemented successfully by outpatient physical therapists, and that it will demonstrate clinically important changes in patients with chronic LBP.

Conclusions: GAS represents an opportunity for patient-centered care in the physical therapy management of chronic LBP. While GAS is not new, it has never been studied in real-world physical therapy for chronic LBP in a clinical setting. Due to unique time and productivity constraints, for GAS to be successfully implemented in this environment, we must demonstrate that clinicians can be trained efficiently and reliably, that GAS can be implemented in a clinical setting in under 15 minutes, and that GAS is able to detect clinically meaningful changes in patient outcomes.
KEywords

goal attainment scaling; goal setting; low back pain; chronic pain; physical therapy; patient engagement; adherence; rehabilitation; physical therapist

Introduction

The patient experience and patient-centered care are the core of the Institute for Healthcare Improvement’s “Triple Aim” (eg, population health, experience of care, and per capita cost) for optimizing the performance of health systems in the United States [1]. Patient engagement in decisions regarding their health care may lead to improved outcomes and improved adherence to treatment plans [2,3]. The interaction between the patient and provider is an essential element of patient-centered care [4]. The qualities of these interactions may best be judged by patients themselves. Patients value providers who listen to them, share information via dialogue, and consider their individual preferences in management of their health conditions [5]. In physical therapy, patients are satisfied if their physical therapist communicates effectively and spends adequate time explaining treatment options throughout the course of care [6]. Furthermore, outcomes and perceived quality of care may improve when patients are actively engaged in their own care [7].

While there are several options for involving patients in their health care, goal setting is a readily accessible method for physical therapists to increase the involvement of patients in health care decisions. Goal setting is an important part of physical therapy in episodes of care and in direct interventions, but the practice and implementation of goal setting is varied across the profession [8]. When physical therapists set goals, it is an opportunity to involve patients and to design interventions that consider individual patient needs [7].

Physical therapy goals are often provider generated and based on subjective information or standardized, fixed-item, patient-reported outcome measures [9]. However, these outcome measures may not fully reveal the activity and participation limitations of individual patients. As individuals have varied needs, their goals may not be identified by standardized measures, and therefore a patient’s particular goals may not be reflected in provider-directed goals. We have investigated patients’ views on whether pain, disability, and recovery measures are meaningful and have found that people with chronic low back pain (LBP) feel that standard measures used to classify patient goals do not reveal what is meaningful to them. Participants in focus groups often state that the standard outcome measures do not capture the fluctuating nature of symptoms or assess improvements in more active pursuits and often do not reveal the complex nature of social roles. While standardized outcome measures are useful for comparing populations, they may be of limited value when assessing individual patient-centered goals [9].

There are several patient-centered approaches used to involve patients in setting meaningful, individualized goals, including the Canadian Occupational Performance Measure, goal attainment scaling (GAS), and self-identified goals assessment [10-12]. GAS has been identified as one of the most time-efficient and reliable ways to involve patients in goal generation during clinical care in real-world settings [11]. GAS procedures are highly variable, with little consensus on the time needed to complete them in clinical practice. The reported time to complete the GAS process ranges from 5 minutes to 60 minutes [13-15]. This range in time to complete may be due to variations in GAS methods, such as the extent of patient involvement, family involvement, and whether GAS was completed by a team or an individual provider. In addition, setting specific goals may be more time-consuming in certain patient populations.

During GAS, patients are engaged in a dialogue to set specific, measurable, achievable, realistic, relevant, and time-based (SMART) goals [16]. Physical therapists often write goals using the SMART format and are well versed in writing SMART goals. The GAS procedure involves a discussion between the patient and provider about patient-directed goals and expected outcomes of treatment. This provides an opportunity for physical therapists to capture fluctuating pain levels, specific activities, and complex social responsibilities that are important to patients. The GAS process is readily accessible, free, and follows defined stages (ie, identifying goals, weighting goals, identifying expected outcomes, establishing a baseline score, and judging actual outcome versus expected outcome at follow-up) [11]. In contrast to standardized, fixed-item, patient-reported outcome measures, GAS generates a T score, which provides a numerical outcome of achievement that can be used for goals across the domains of the International Classification of Functioning, Disability, and Health (ICF) with varying difficulty, importance, and expected achievement [17]. The individualized outcome generated from GAS may prove helpful in enhancing traditional methods of collecting outcome measures and setting goals.

GAS is helpful when comparing heterogenous patient populations, who may have complex presentations and backgrounds [17]. Therefore, most of the literature related to applying GAS describes findings in a rehabilitation setting with pediatric patients or patients with neurologic deficits [17,18]. Recently, GAS has been applied in patients with chronic LBP [2,9,19-22], as patients with chronic LBP have varying clinical presentations, severity levels, and treatment options [23]. Considering that LBP is the most common reason patients seek physical therapy in an outpatient setting [24] and that it is one of the most common causes of disability in the United States [25-27], patients with chronic LBP may be an ideal population for assessing the feasibility of GAS in a physical therapy outpatient setting. While there is evidence for the reliability, validity, and feasibility of GAS procedures [17], there is limited evidence in the United States about physical therapist use of GAS in the management of patients with chronic LBP. Furthermore, a recent systematic review found significant variability in GAS procedures used for patients with LBP and recommended development of a standardized approach and training for clinicians applying GAS [28]. GAS is a promising method of focusing on patient-centered outcomes and goals.
but it is not clear how this method may complement standard, pre-existing outcome measures used by physical therapists and how feasible it is in an outpatient setting for patients with chronic LBP. GAS is novel because it provides a standardized means to set patient-provided goals that are quantifiable and can be used to track progress of the patient and compare outcomes across patients. Therefore, the purpose of this paper is to describe the protocol for a study to (1) develop a new application of GAS procedures to be used by physical therapists treating patients with chronic LBP in the United States and (2) test the feasibility of applying GAS procedures in the treatment of patients with chronic LBP in an outpatient physical therapy setting.

**Methods**

**Ethics Approval**

The University of South Florida (USF) Institutional Review Board approved this study on April 10, 2019 (Pro00035236), and the approval has been maintained in good standing.

**Study Design**

This study used a mixed methods design with 2 phases: qualitative and quantitative. Figure 1 shows a study overview. The qualitative phase of the study employed focus groups of patients with chronic LBP to identify an inventory of goals that are important and measurable. This inventory was used to develop a series of prompts that will allow physical therapists to assist patients in establishing goals in a clinical setting [22]. The quantitative phase of the study pilot-tested the inventory developed in the qualitative phase in patients with chronic LBP to determine feasibility, reliability, validity, and responsiveness. We will also compare how well GAS identifies changes over time compared to traditional, fixed-item, patient-reported measures.
Phase 1

Participants
We assembled 4 to 6 focus groups comprising 6 to 10 adults with chronic LBP from the local community using research alerts sent via the university email listservs. We expected that approximately 30 adults would be needed for this study, as a minimum of 4 focus group discussions are needed to reach code saturation [29-31]. Participants were included if they were adults (aged 21-64 years) with a history of nonspecific chronic LBP lasting >12 weeks with or without radicular symptoms. Participants were excluded if they had a structural spinal deformity, spinal fracture, osteoporosis, or systemic disease; had undergone previous spinal surgery; were pregnant or had given birth within the last 6 months; had pending litigation related to worker's compensation; or were undergoing treatment covered under worker's compensation. Participants were recruited from the Tampa Bay area.

Procedures
Focus groups were conducted face-to-face via internet-based meetings to explore participants’ views about the types of goals that should be included in GAS for patients with chronic LBP. There were 6 meetings with 6 to 10 participants that lasted approximately 2 hours [29]. An experienced facilitator led discussions. Field notes were taken during the interviews and
audio recordings of each focus group were transcribed verbatim for further analysis.

Data Analysis

Participant views were examined with grounded theory principles [32,33]. A grounded theory approach was chosen because the intent of the qualitative portion of the study was to understand what was important about patients’ self-identified goals and why. This understanding was used to develop a standardized language and inventory of goals to facilitate the clinical implementation of GAS. We initially became familiar with the data by verifying the transcripts against the audio files and the field notes from each focus group to ensure accuracy and validation of speech allocation to individual participants. Coding began after the transcripts were read and became familiar to the researchers. Data were collected and coded until no new information was found (ie, saturation of the data was achieved). Qualitative data management software (MAXQDA, VERBI Software) was used to facilitate this process.

Once collected and transcribed, the data were independently coded, compared, and organized by 2 or more researchers using a constant comparison method. This qualitative procedure allows meaningful statements from the transcripts to be conceptualized in new ways [34]. The data coding process included open coding to determine code categories. Open coding was guided by sensitizing concepts found in the literature, including the ICF domains. Coding proceeded to the axial and selective phases to identify patterns in the data and identify the central themes that emerged. Several strategies were used to enhance rigor, including analytical triangulation using multiple coders, setting the goal for intercoder reliability to $\kappa=0.80$ (Cohen $\kappa$) using a coder-by-coder agreement matrix, peer debriefing group meetings to minimize researcher bias, and member checking to verify findings after focus group participation.

Phase 2

Participants

We recruited approximately 30 patients with chronic LBP who sought physical therapy from the USF Physical Therapy Center at the USF Morsani Center for Advanced Healthcare. A sample of 30 participants is considered appropriate for pilot studies of feasibility, and sufficient to estimate effect sizes for confirmatory trials [35,36]. In order to estimate effect size, we used the findings from this study and retrospective change scores from patients with chronic LBP who did not participate in GAS (from our own clinic and from published data) as a comparison group. The USF Physical Therapy Center is the faculty practice of the USF School of Physical Therapy and Rehabilitation Science. This center services the Tampa Bay area and admits approximately 30 patients with chronic LBP each month. The demographics of Tampa Bay closely match national demographics and are very diverse socioeconomically, racially, and ethnically, making Tampa a strategically desirable location for clinical trials.

Participants who met the following criteria were sequentially recruited: aged 21-64, LBP located between the lower rib cage and gluteal fold [37], pain lasting >12 weeks [37-39], pain that was not attributable to a specific pathology [40], pain on at least 50% of days in the past 6 months [37], and average pain intensity >2 out of 10 on the Numerical Pain Rating Scale. Participants with a spinal deformity, surgery or fracture, rheumatoid arthritis, extremity pain, physical therapy treatment within the past 6 months, or automobile- or work-related injury were excluded.

Procedures

Physical therapists from the USF Physical Therapy Center were trained in GAS procedures based upon the principles of Williams and Stieg [2]; these procedures have been described for use in rehabilitation [41]. Therapist training consisted of 2 self-directed learning modules that covered background information, goal setting and negotiation, the benefits of GAS in diverse patient populations, the use of GAS in patients with chronic LBP, and the implementation of the stages of GAS. Case examples, including videos, were interwoven throughout the modules and an assessment was completed upon conclusion of training. The final step in the training was an interactive session with a study investigator that included role-playing the GAS procedures and providing feedback on performance. Once the therapists were trained (but before they saw patients as part of this study), they completed a posttest and a short survey and were briefly interviewed to examine their views regarding the feasibility of the GAS process. The training design will be streamlined for future studies to facilitate deployment to clinicians. Therapist interviews were transcribed for thematic analysis.

Once the therapists completed training and met all assessment criteria, therapist and patient encounters using GAS commenced. To recruit patients from the USF Morsani Physical Therapy Center, a clinician (included as a research staff member in this study) reviewed electronic medical records of incoming patients. Patients with chronic LBP were contacted via email or traditional mail (if a patient did not have or did not provide an email address) ahead of their visit with information regarding the study. This allowed the potential participant sufficient time prior to their first visit to consider whether they wished to take part in the study. Interested patients were instructed to contact members of the study team. Potential participants were screened and provided consent before participation. During the clinician encounter, which was part of their normal therapy visit, the patient and therapist jointly completed the first part of the GAS using the GAS-Back form. In addition, the participants self-reported the following measures: the Oswestry Disability Index, the Numerical Pain Rating Scale, and the National Institutes of Health Minimal Dataset. These patient-reported outcomes are commonly recommended for use in clinical and research settings and measure a patient’s perceptions of impairments in body structure and function, activity limitations, and participation restrictions (see Multimedia Appendix 1 for details) [37,42-44]. At the completion of the first visit, the patient completed a form for patient satisfaction with the goal-setting process and the clinician completed a form for patient level of engagement in goal setting. Audio recordings of patient visits were made. This was necessary to determine the reliability and feasibility of GAS in a clinical setting. Additionally, recording the encounter instead of having a research team member observing in the patient room allowed for a more natural interaction between clinician and patient.

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Following the initial visit, therapy sessions proceeded as determined in each participant’s physical therapy plan of care.

At the final physical therapy session (ie, at discharge), the Oswestry Disability Index and Numerical Pain Rating Scale were completed along with an abbreviated version of the National Institutes of Health Minimal Dataset, containing only the Patient-Reported Outcomes Measurement Information System items [37]. Additionally, the second part of the GAS-Back form, which regards goal achievement, was finalized, global perceived effect and patient satisfaction were measured, and the “collaboRATE” shared decision-making questionnaire was completed. We estimated these could be completed within 20 minutes. If a patient did not return for the last visit, the therapist called to follow up and the final questionnaire was completed over the phone or by using an online platform (Qualtrics).

Data Analysis

The success of GAS will be assessed based on feasibility, reliability, and validity. To consider the implementation of GAS in routine clinical practice, it must be administered in a timely (<15 minutes average examination time) and consistent (checklist adherence >80%) manner. The GAS process, feasibility, and fidelity will be evaluated by measuring the time (in minutes) to perform the GAS process, checklist adherence (as a percentage), and the nature of the goals identified (using the ICF domains) [45,46]. Interrater reliability of GAS scores will be assessed by examining the association between 2 independent physical therapist examiners using the Spearman rank correlation [33]. Criterion validity of GAS scores will be assessed by examining the association between GAS and Oswestry Disability Index scores [33,41]. The standardized response means (SRMs) for the Numerical Pain Rating Scale, Oswestry Disability Index, and GAS will be determined and compared to evaluate responsiveness [20]. A larger SRM indicates increased responsiveness of the measure to change. The SRM will be calculated as the ratio of change from pre-to posttest divided by the standard deviation of the change score [33]. A chi-square analysis will determine if different outcome measures show different proportions of patients determined to improve on that test by more than the minimally important change [33]. While a generally accepted and standardized definition of success for management of chronic LBP has not been established [42], our operational definition of success is as follows: if a patient shows changes that exceed the minimally important change or cutoff point for each individual measure, that patient’s outcome will be defined as successful. Minimally important changes for this analysis will be set at 2 points for the Numerical Pain Rating Scale [44], 10 points for the Oswestry Disability Index [47], and 2 points for the global perceived effect rating [48]. Cutoff points will be set at ≥50 points for GAS [20]. A GAS score of 50 indicates that the expected outcome was achieved, while a score greater than 50 indicates performance exceeding the expected outcome [20]. As analyses using change scores have weaknesses, we will also apply alternative approaches, such as analysis of covariance and residual change score [49]. The measures proposed in this study, including GAS, have acceptable reliability, validity, and responsiveness (Multimedia Appendix 1).

Results

Anticipated Results

Overall, we anticipate that this study will demonstrate that GAS can be implemented in a consistent and timely manner by outpatient physical therapists, and that patients with chronic LBP will demonstrate clinically important changes that are also important to them. In phase 1 we anticipate that the inventory of goals will accurately represent the domains most important to patients with chronic LBP. This inventory of goals should allow for a series of prompts that can be used by physical therapists to expedite the GAS process in an outpatient setting. In phase 2 we anticipate finding that GAS will be feasible to implement in an outpatient setting. To demonstrate this feasibility, we anticipate that we will find that physical therapist training results in a reliable and timely use of GAS. Furthermore, we anticipate that GAS will demonstrate validity and responsiveness to change when compared to outcome measures commonly used in chronic LBP.

Study Timeline

Phase 1

Data collection was completed with the last focus group being held in June 2020. Preliminary data analysis was completed, and the information gleaned from this analysis was used to develop a series of prompts that were used to support the GAS process in phase 2.

Phase 2

Therapist training was completed in March 2021. Subject recruitment commenced following therapist training, and data collection began in March 2021. Data collection was completed in December 2021, and we expect data analysis to be completed by March 2022. This study is expected to conclude in late 2022.

Discussion

Principal Aims

This study aims to develop and test the feasibility of a novel application of GAS by physical therapists treating chronic LBP. It represents an important innovation because it facilitates patient-provider interaction and produces goals that encompass the activities and participation that are important to the patient. While goal setting is already part of the routine practice of physical therapists, the process is highly variable, with goals that are traditionally provider generated [8,50]. Knowledge of patient-initiated and patient-centered goals will enable health care providers to offer interventions that are more individualized and focused toward specific goals, leading to improved outcomes [18]. Furthermore, traditional, standardized, fixed-item patient-reported measures used for patients with chronic LBP (ie, the Numerical Pain Rating Scale and Oswestry Disability Index) may fail to measure constructs that are important to all patients, and therefore GAS may be better able to detect clinical changes that are meaningful to the patient. It is important to note that we are not recommending that we abandon current traditional, fixed-item, patient-reported outcome measures (eg, the Oswestry Disability Index and Numerical Pain Rating Scale).

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Rather, we believe that GAS can provide complementary information that augments these more established measures.

**Conclusion**

GAS represents an opportunity for patient-centered care in the physical therapy management of chronic LBP. While GAS is not new, it has never been studied in real-world physical therapy for chronic LBP in a clinical setting, a type of practice that has unique time and productivity constraints. For GAS to be successfully implemented in this environment, we must demonstrate that clinicians can be trained efficiently and reliably, that GAS can be implemented in a clinical setting in under 15 minutes, and that GAS is able to detect clinically meaningful changes in patient outcomes.

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**Conflicts of Interest**

None declared.

**Multimedia Appendix 1**

Reliability and validity.
[DOCX File, 41 KB-Multimedia Appendix 1]

**References**

1. Institute for Healthcare Improvement. The IHI Triple Aim. URL: http://www.ihi.org/Engage/Initiatives/TripleAim/Pages/default.aspx [accessed 2021-07-27]

2. Williams R, Stieg R. Validity and Therapeutic Efficacy of Individual Patient Goal Attainment Procedures in a Chronic Pain Treatment Center. Clin J Pain 1986 Jul 06;2(4):219-228 [FREE Full text] [doi: 10.1097/00002508-198612000-00003]

3. Levack WMM, Dean SG, Siegert RJ, McPherson KM. Purposes and mechanisms of goal planning in rehabilitation: the need for a critical distinction. Disabil Rehabil 2006 Jun 30;28(12):741-749. [doi: 10.1080/09638280500262596] [Medline: 16754571]

4. Cooper K, Smith BH, Hancock E. Patient-centredness in physiotherapy from the perspective of the chronic low back pain patient. Physiotherapy 2008 Sep;94(3):244-252. [doi: 10.1016/j.physio.2007.10.006]

5. Jaensch D, Baker N, Gordon S. Contemporaneous patient and health professional views of patient-centred care: a systematic review. Int J Qual Health Care 2019 Dec 31;31(10):G165-G173. [doi: 10.1093/intqhc/mzz118] [Medline: 31788686]

6. Hush J, Cameron K, Mackey M. Patient satisfaction with musculoskeletal physical therapy care: a systematic review. Phys Ther 2011 Jan;91(1):25-36. [doi: 10.2522/ptj.20100061] [Medline: 21071504]

7. Armetz JE, Almin I, Bergström K, Franzén Y, Nilsson H. Active patient involvement in the establishment of physical therapy goals: Effects on treatment outcome and quality of care. Adv Physiother 2009 Jul;11(2):50-69. [doi: 10.1080/140381909310017147]

8. Baker S, Marshak H, Rice G, Zimmerman G. Patient participation in physical therapy goal setting. Phys Ther 2001;81(5):1118-1126. [doi: 10.1093/ptj/81.5.1118]

9. Hazard RG, Spratt KF, McDonough CM, Carayannopoulos AG, Olson CM, Reeves V, et al. The Impact of Personal Functional Goal Achievement on Patient Satisfaction With Progress One Year Following Completion of a Functional Restoration Program for Chronic Disabling Spinal Disorders. Spine 2009;34(25):2797-2802. [doi: 10.1097/brs.0b013e3181a9e640]

10. Toomey M, Nicholson D, Carswell A. The clinical utility of the Canadian Occupational Performance Measure. Can J Occup Ther 1995 Dec 22;62(5):242-249. [doi: 10.1177/0008417495060200503] [Medline: 10152880]

11. Kiresuk TJ, Sherman RE. Goal attainment scaling: A general method for evaluating comprehensive community mental health programs. Community Ment Health J 1968 Dec;4(4):443-453. [doi: 10.1007/bf01530764]

12. Melville LL, Baltic TA, Betcher TW, Nelson DL. Patients' perspectives on the self-identified goals assessment. Am J Occup Ther 2002 Nov 01;56(6):650-659. [doi: 10.5014/ajot.56.6.650] [Medline: 12458857]

13. Stolee P, Rockwood K, Fox RA, Streiner DL. The use of goal attainment scaling in a geriatric care setting. J Am Geriatr Soc 1992 Jun 27;40(6):574-578. [doi: 10.1111/j.1532-5415.1992.tb02105.x] [Medline: 1587973]

14. Rockwood K, Stolee P, Fox-P, RA. Use of goal attainment scaling in measuring clinically important change in the frail elderly. J Clin Epidemiol 1993 Oct;46(10):1113-1118. [doi: 10.1016/0895-4356(93)90110-m]

15. Yip AM, Gorman MC, Stadnyk K, Mills GW, MacPherson KM, Rockwood K. A standardized menu for Goal Attainment Scaling in the care of frail elders. Gerontologist 1998 Dec 01;38(6):735-742. [doi: 10.1093/geront/38.6.735] [Medline: 9868853]
16. Bovend'Eerdt TJH, Botell RE, Wade DT. Writing SMART rehabilitation goals and achieving goal attainment scaling: a practical guide. Clin Rehabil 2009 Apr;23(4):352-361. [doi: 10.1177/0269215508107441] [Medline: 19237435]

17. Hurn J, Kneebone I, Cropley M. Goal setting as an outcome measure: A systematic review. Clin Rehabil 2006 Sep 27;20(9):756-772. [doi: 10.1177/0269215506070793] [Medline: 17005500]

18. Levack WM, Taylor K, Siegert RJ, Dean SG, McPherson KM. Is goal planning in rehabilitation effective? A systematic review. Clin Rehabil 2006 Sep 27;20(9):739-755. [doi: 10.1177/0269215506070791] [Medline: 17005499]

19. Hazard RG, Spratt KF, McDonough CM, Olson CM, Ossen ES, Hartmann EM, et al. Patient-centered evaluation of outcomes from rehabilitation for chronic disabling spinal disorders: the impact of personal goal achievement on patient satisfaction. Spine J 2012 Dec;12(12):1132-1137 [FREE Full text] [doi: 10.1016/j.spinee.2012.09.003] [Medline: 23067862]

20. Mannion AF, Caporaso F, Pulkovski N, Sprott H. Goal attainment scaling as a measure of treatment success after physiotherapy for chronic low back pain. Rheumatology (Oxford) 2010 Sep 28;49(9):1734-1738. [doi: 10.1093/rheumatology/keq160] [Medline: 20511346]

21. Fisher K, Hardie RJ. Goal attainment scaling in evaluating a multidisciplinary pain management program. Clin Rehabil 2002 Dec 01;16(8):871-877. [doi: 10.1191/0269215502cr5540a] [Medline: 12501949]

22. Mullis R, Hay E. Goal scaling for low back pain in primary care: development of a semi-structured interview incorporating minimal important change. J Eval Clin Pract 2010 Dec;16(6):1209-1214. [doi: 10.1111/j.1365-2753.2009.01296.x] [Medline: 20695953]

23. Chou R, Loeser JD, Owens DK, Rosenquist RW, Atlas SJ, Baisden J, American Pain Society Low Back Pain Guideline Panel. Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: an evidence-based clinical practice guideline from the American Pain Society. Spine (Phila Pa 1976) 2009 May 01;34(10):1066-1077. [doi: 10.1097/BRS.0b013e3181a390d] [Medline: 19363457]

24. Wu A, March L, Zheng X, Wang X, Zhao J, et al. Global low back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017. Ann Transl Med 2020 Mar;8(6):299 [FREE Full text] [Medline: 32355743]

25. Marra S, Occupational low back disorder causation and control. Ergonomics 2000 Jul;43(7):880-902. [doi: 10.1080/0014013004090808] [Medline: 10929824]

26. Guo HR, Tanaka S, Halperin WE, Cameron LL. Back pain prevalence in US industry and estimates of lost workdays. Am J Public Health 1999 Jul;89(7):1029-1035. [doi: 10.2105/aphj.89.7.1029] [Medline: 10394311]

27. Marras WS. Occupational low back disorders: epidemiology and control. Ergonomics 2000 Jul 10;43(7):880-902. [doi: 10.1080/0014013004090808] [Medline: 10929824]

28. Haladay D, Swisher L, Hardwick D. Goal attainment scaling for patients with low back pain in rehabilitation: A systematic review. Health Sci Rep 2021 Sep 22;4(3):e378-e312 [FREE Full text] [doi: 10.1002/hsr2.378] [Medline: 34589616]

29. Carpenter C. Using qualitative focus groups to evaluate health programmes and service delivery. In: Hammell KW, Carpenter C, editors. Qualitative Research in Evidence-Based Rehabilitation. London, UK: Churchill Livingstone; 2004:51-64.

30. Hennink MM, Kaiser BN, Marconi VC. Code Saturation versus Meaning Saturation: How Many Interviews Are Enough? Qual Health Res 2017 Mar 26;27(4):591-608. [doi: 10.1177/1049732316665344] [Medline: 27670770]

31. Thomson S. Sample Size and Grounded Theory. JOAAG 2011;5(1):45-52 [FREE Full text] [Medline: 16513996]

32. Walker D, Myrick F. Grounded theory: an exploration of process and procedure. Qual Health Res 2006 Apr;16(4):547-559. [doi: 10.1177/1049732305285972] [Medline: 16513996]

33. Portney PL. Foundations of Clinical Research: Applications to Practice 3rd ed. Philadelphia: FA Davis Company; 2015:569-658.

34. Oktay J. Grounded theory. In: Pocket guides to social work research methods. Oxford: Oxford University Press; 2012:52-103.

35. Browne RH. On the use of a pilot sample for sample size determination. Stat Med 1995 Sep 15;14(17):1933-1940. [doi: 10.1002/sim.4780141709] [Medline: 8532986]

36. Billingham SAM, Whitehead AL, Julious SA. An audit of sample sizes for pilot and feasibility trials being undertaken in the United Kingdom registered in the United Kingdom Clinical Research Network database. BMC Med Res Methodol 2013;13:104 [FREE Full text] [doi: 10.1186/1471-2288-13-104] [Medline: 23961782]

37. Deyo RA, Dworkin SF, Amundson D, Andersson G, Borenstein D, Carragee E, et al. Report of the NIH Task Force on Research Standards for Chronic Low Back Pain. Spine J 2014 Aug 01;14(8):1375-1391. [doi: 10.1016/j.spinee.2014.05.002] [Medline: 24950669]

38. Delitto A, George SZ, Van Dillen L, Whitman JM, Sowa G, Shekelle P, et al. Low Back Pain. J Orthop Sports Phys Ther 2012 Apr;42(4):A1-A57. [doi: 10.2519/jospt.2012.42.4.al]

39. Chou R, Qaseem A, Snow V, Casey D, Cross JT, Shekelle P. Clinical Efficacy Assessment Subcommittee of the American College of Physicians, American College of Surgeons, American Pain Society Low Back Pain Guideline Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann Intern Med 2007 Oct 02;147(7):478-491 [FREE Full text] [doi: 10.7326/0003-4819-147-7-200710020-00006] [Medline: 17909209]

40. Balagué F, Mannion AF, Pellisé F, Cedraschi C. Non-specific low back pain. The Lancet 2012 Feb;379(9814):482-491. [doi: 10.1016/s0140-6736(11)60610-7]
41. Turner-Stokes L. Goal attainment scaling (GAS) in rehabilitation: a practical guide. Clin Rehabil 2009 Apr 29;23(4):362-370. [doi: 10.1177/0269215508101742] [Medline: 19179355]

42. Chapman JR, Norvell DC, Hermsmeyer JT, Bransford RJ, DeVine J, McGirt MJ, et al. Evaluating Common Outcomes for Measuring Treatment Success for Chronic Low Back Pain. Spine 2011;36:S54-S68. [doi: 10.1097/brs.0b013e31822ef74d]

43. Hush JM, Kamper SJ, Stanton TR, Ostelo R, Refshauge KM. Standardized measurement of recovery from nonspecific back pain. Arch Phys Med Rehabil 2012 May;93(5):849-855. [doi: 10.1016/j.apmr.2011.11.035] [Medline: 22444028]

44. Ostelo RWJG, Deyo RA, Stratford P, Waddell G, Croft P, Von Korff M, et al. Interpreting Change Scores for Pain and Functional Status in Low Back Pain. Spine 2008;33(1):90-94. [doi: 10.1097/brs.0b013e31815e3a10]

45. Bellg AJ, Borrelli B, Resnick B, Hecht J, Minicucci DS, Ory M, et al. Enhancing treatment fidelity in health behavior change studies: best practices and recommendations from the NIH Behavior Change Consortium. Health Psychol 2004 Sep;23(5):443-451. [doi: 10.1037/0278-6133.23.5.443] [Medline: 15367063]

46. Lewis V, Dell L, Matthews L. Evaluating the feasibility of Goal Attainment Scaling as a rehabilitation outcome measure for veterans. J Rehabil Med 2013 Apr;45(4):403-409 [FREE Full text] [doi: 10.2340/16501977-1131] [Medline: 23546308]

47. Downie A, Williams CM, Henschke N, Hancock MJ, Ostelo RWJG, de Vet HCW, et al. Red flags to screen for malignancy and fracture in patients with low back pain: systematic review. BMJ 2013 Dec 11;347:f7095 [FREE Full text] [doi: 10.1136/bmj.f7095] [Medline: 24335669]

48. Kamper SJ, Maher CG, Mackay G. Global rating of change scales: a review of strengths and weaknesses and considerations for design. J Man Manip Ther 2009 Jul 18;17(3):163-170 [FREE Full text] [doi: 10.1179/jmt.2009.17.3.163] [Medline: 20046623]

49. Kissbu-Sakarya Y, MacKinnon DP, Aiken LS. A Monte Carlo Comparison Study of the Power of the Analysis of Covariance, Simple Difference, and Residual Change Scores in Testing Two-Wave Data. Educ Psychol Meas 2013 Feb 17;73(1):47-62 [FREE Full text] [doi: 10.1177/0013164412450574] [Medline: 26412869]

50. Scobbie L, Wyke S, Dixon D. Identifying and applying psychological theory to setting and achieving rehabilitation goals. Clin Rehabil 2009 Apr 17;23(4):321-333. [doi: 10.1177/0269215509102981] [Medline: 19293291]

**Abbreviations**

- **GAS**: goal attainment scaling
- **ICF**: International Classification of Functioning, Disability, and Health
- **LBP**: low back pain
- **SMART**: specific, measurable, achievable, realistic, and time-based
- **SRM**: standardized response mean
- **USF**: University of South Florida

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