Title

The relationship between psychological, cognitive, and contextual factors and rehabilitation outcomes in Achilles tendinopathy: a prospective feasibility cohort study.

Running title

Clinical outcomes in Achilles tendinopathy

Authors

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Abstract

Background: A full-scale cohort study is required to investigate the influence of psychological, cognitive, and contextual factors (patient-related factors) on outcomes of rehabilitation in Achilles tendinopathy (AT).

Objectives: The primary aim of this study was to investigate the feasibility of conducting the proposed full-scale study via evaluating the rates of recruitment, conversion, and response to the questionnaires. The secondary aim was to investigate preliminary relationships between baseline patient-related factors and clinical outcomes at 12- and 26-weeks.

Design: Prospective feasibility cohort.

Setting: Australian healthcare settings.

Methods: Potential participants with AT receiving physiotherapy treatment in Australia were recruited via treating physiotherapists and an online strategy. Data were collected via online questionnaires completed at baseline, 12- and 26-weeks. Progression criteria for a full-scale study were recruitment rate of ≥10 per month, conversion rate ≥ 20%, and response rate to questionnaires ≥ 80%. The relationship between patient-related factors and clinical outcomes was investigated using Spearman's rho correlation coefficient.

Results: The average recruitment rate was 5 per month [30/6 months], 30/31 eligible participants agreed to participate (conversion rate 97%), and response rate to questionnaires was ≥ 97% at all timepoints. There was a fair to moderate correlation (rho= 0.225 to 0.683) between patient-related factors and clinical outcomes at the 12-week, but no to weak correlation at the 26-week (rho= 0.002 to 0.284).

Conclusion: Feasibility outcomes suggest a future full-scale cohort study is feasible with the caveat of utilizing strategies to improve the recruitment rate. Preliminary bivariate correlations at 12-weeks warrant further investigations in larger studies.

Keywords: Achilles Tendon, Rehabilitation, Tendinopathy, Psychology.

Introduction

Achilles tendinopathy (AT) is a painful musculoskeletal condition that often develops as a response to tendon overloading and may affect athletic and non-athletic populations.[8] Clinical manifestations of AT are load-dependent localized tendon pain and associated functional disability.[44] The condition can develop at the tendon mid-region, or insertion, and is diagnosed based on patient history, clinical presentation, and physical examination, without a necessity for tendon imaging.[22,38] Factors such as age, gender, metabolic health, impaired calf strength, and training errors may modulate the risk of developing AT.[26,42] Tendon pain associated with AT can be persistent, impairing daily functional activities[31] and quality of life.[45]

Clinical practice guidelines and systematic reviews recommend calf exercise programs over an 8 to 12 weeks period as a first-line management strategy for AT to reduce tendon pain and restore function.[24,30,40] This is usually supplemented by modification of provocative activities and patient education.[30] Although some individuals may respond favorably to calf exercise programs,[2] others are nonresponsive and suffer ongoing pain and dysfunction.[37,43] For example, Sayana and Maffulli (2007) reported that 44% of AT patients failed to respond to 12-week isolated eccentric calf training.[43] Factors accounting for interindividual variation in responses to calf exercise programs remain unclear.

Outcomes of a particular intervention may be influenced by specific patient-related characteristics/factors, also known as treatment effect modifiers.[11] In patients with musculoskeletal pain conditions such as chronic low back pain and fibromyalgia, it is well documented that rehabilitation outcomes such as self-reported pain and function are influenced by psychological factors (i.e., depression, anxiety, and fear-avoidance beliefs),[9,33,46] and by cognitive and contextual factors (i.e., pain self-efficacy, outcome expectations, and working alliance).[27,29] The varied responses to first-line treatments for Achilles tendinopathy may be explained by the presence of these factors, however, this is yet to be investigated.

A full-scale prospective cohort study is needed to investigate the influence of psychological, cognitive, and contextual factors on clinical outcomes in AT rehabilitation. Although Mallows et. al., (2020) recently investigated the feasibility of conducting a full-scale study investigating the influence of self-efficacy and working alliance on treatments outcomes for AT in a UK context,[28] the feasibility of a similar cohort in an Australian healthcare context is not known.

The primary aim of this study was to investigate the feasibility of conducting a full-scale cohort study via evaluating the conversion and recruitment rates, and the response to questionnaire

rate at 12- and 26-weeks. The secondary aim was to perform a preliminary bivariate correlation between psychological (depression and anxiety, and kinesiophobia), cognitive (pain self-efficacy and outcome expectations), and contextual (working alliance) factors, and clinical outcomes (global rating of change, pain intensity, and functional level) at 12- and 26-weeks.

Methods

Study design

This prospective feasibility cohort study was reported according to the Strengthening the Reporting of Observational studies in Epidemiology **(**STROBE) guidelines for observational studies.[49] The study was approved by Monash University Human Research Ethics Committee chaired by Professor Nip Thomson (project number 26358, approval date 12/10/2020) and has been conducted in accordance with the principles set forth in the Helsinki Declaration. Online written informed consent was provided by all participants before their participation.

Study setting

People with AT receiving physiotherapy treatment in Australian healthcare settings were recruited online from November 2020 to May 2021. Registration for participation was via the following study website (http://www.achillesresearch.com.au/). Data collection for the selected variables and clinical outcomes was conducted at baseline, 12- and 26-weeks.

Participants

Potential participants with midportion and/or insertional AT were included in this study. Both midportion and insertional AT were included because there is no evidence that psychological, cognitive, and contextual factors would have a differential effect on outcomes for these conditions. Participants had to be ≥ 18 years old, receiving (had undertaken ≤ 2 sessions) or soon to commence (within 1 week) face-to-face physiotherapy treatment for AT, and were fluent in written and spoken English. Participants were excluded if they had Achilles symptoms of less than 6 weeks, had an injection for Achilles pain in the last 2 months (because this may influence the outcome and confound the relationship between variables of interest and clinical

outcomes), had a history of Achilles rupture or surgery on the current most symptomatic side, or had a systemic inflammatory disease (i.e., rheumatoid arthritis, ankylosing spondylitis).

Recruitment and online screening

Online recruitment of participants was via the following strategies:

1. Referrals from treating physiotherapists: An email was sent to ~600 physiotherapy clinics that were on a database of Australian physiotherapy clinics developed via public-facing information from Google searches. Advertisements/posts (including study details, researcher's contact details, the study website, and the website QR code) targeting Australian physiotherapists were also placed in the Australian Physiotherapy Association electronic newsletter and on Twitter. Respondents to the emails to physiotherapy clinics or advertisements via the Australian Physiotherapy Association or Twitter were sent an email with a printable flyer (included study information and the website QR code). Physiotherapists were asked to hand out the flyer to the potentially eligible participants.

2. Participant's self-registration: Social media advertisements/posts (including study details, researcher's contact details, the study website, and the website QR code) targeting people with pain in the Achilles tendon region were placed on Facebook and Instagram. Potential participants were asked whether they were currently receiving or about to commence physiotherapy treatment for their Achilles tendon problem (only people who answered yes to this question were screened via phone and then via teleconference – described below).

Phone and teleconference screening

One researcher (E.M) screened potentially eligible website respondents via telephone (phone call or SMS) followed by a single 20-minute teleconference session (Zoom or alternatives platforms as appropriate) for those who passed the phone screening. In the phone-call/SMS, basic eligibility criteria were checked (i.e., the number of physiotherapy sessions received, duration of Achilles symptoms, injection for Achilles pain in the last 2 months, a history of Achilles rupture or surgery on the current most symptomatic side, and systemic inflammatory conditions).

The teleconference diagnostic screen was based on the following established diagnostic criteria: gradual onset pain consistent with insertional (at the insertion of the tendon to the calcaneum) or midportion (2-7 cm above the calcaneum), reproduction of pain at the defined sites by either a heel raise in standing or hopping tests, absence of clinical signs of other ankle pathologies that may be explaining the pain (e.g. posterior impingement, accessory soleus, symptoms consistent with tibialis posterior tendon). Although not validated, the researcher took time to guide the patient through a comprehensive screening process developed based on available literature[22,30] and extensive discussion and piloting among the researchers (the teleconference assessment and screening for each participant are detailed in a Supplementary file*).*

Feasibility outcomes

Feasibility outcomes were conversion and recruitment rates, and response rate to questionnaires at 12- and 26-weeks. Conversion rate is defined as the proportion of eligible participants who consent to participate in the study. Recruitment rate is the number of eligible participants recruited per month. Our progression criteria for a full-scale cohort study were: (1) recruitment rate of 10 or greater per month; (2) conversion rate of 20% or greater; and (3) 80% or greater response to questionnaires (adapted from Malliaras et., al. (2020)[25]).

Secondary outcomes

Depression and anxiety: Measured by Depression Anxiety Stress Scale (DASS-21) which is a well-established tool to measure symptoms of depression, anxiety, and stress across different populations.[16,20] It includes 21 items with 7 items per subscale (i.e., depression, anxiety, and stress).[36] Every item is scored on a scale from 0 (Did not apply to me at all-never) to 3 (Applied to me very much, or most of the time - almost always). DASS-21 scores of 28 to 42 are categorized as extremely severe, 21 to 27 severe, 13 to 20 moderate, 10 to 12 mild, and 0 to 9 normal.[21]

Kinesiophobia: Measured by Tampa Scale for Kinesiophobia-11 (TSK-11) which is the shortened form of the previously developed 17-item TSK.[50] Each item is rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Total scores range from 11 to 44 and higher scores indicate extreme fear of pain/(re)injury with movement.[47,50]

Pain self-efficacy: Measured by Pain Self-Efficacy Questionnaire (PSEQ) which is a valid tool that consists of ten domains. Participants were required to rate the strength of beliefs on their ability to perform activities despite the pain on a numerical rating scale of 0-6. The highest score is 60 and represents high pain self-efficacy.[3,32]

Outcome expectations: The current literature does not support a specific measurement scale to quantify outcome expectations[5] and implementing a simple but consistent method for measuring expectations has been recommended.[5,23] Participants were asked, "How much do you expect your Achilles pain to change as a result of physiotherapy treatment?". Clear instruction was provided as follows (please indicate what you think will occur NOT what you want to occur at the end of your treatment) to differentiate predicted expectations from ideal expectations. Responses were graded on a numerical scale from very much worse (-5) to very much better (+5).

Working alliance: Measured by Working Alliance Inventory Short-Form (WAI-SF). The WAI-SF consists of 12 domains that rate the agreement between the patient and the treating clinician on a 5-point Likert scale ranging from 1 (seldom) to 5 (always). The highest score is 60 and indicates a stronger working alliance.[15]

Clinical outcomes

Clinical outcomes were based on recommendations from a recent consensus on the core domain for tendinopathy[48] and included:

Global rating of change: The self-perceived change in the health status (improvement or lack of improvement) since the start of physiotherapy treatment was measured by the Global Rating of Change score (GRoC). In response to the question "Please rate the overall condition of your Achilles tendon from the time you began treatment until now", the patient scores the magnitude of change on a numerical rating scale from −5 (very much worse) to +5 (very much better). A change of ≥ 2 is considered clinically meaningful.[18]

Worst pain over the last week: The worst pain experienced in the last week was measured using the Numerical Pain Rating Scale (NPRS). The NPRS requires the patients to rate their pain on a defined scale from 0–10 where 0 indicates no pain and 10 indicates the worst pain imaginable. Participants were asked "Regarding your Achilles tendon, how would you rate the worst pain

that you have experienced during the last week?". A numeric change of two points on NPRS often represents a clinically important difference.[12]

Composite pain, function, and disability: The Victorian Institute of Sports Assessment-Achilles (VISA-A) is a self-administered instrument that is widely implemented in clinical practice and research settings to assess the severity of Achilles tendinopathy and to monitor improvements in response to a given treatment.[39] It includes eight questions that measure the domains of pain, function in daily living, and disability. Scores range from 0-100 in which scores around 24 represent a very poor function and score ≥ 90 represents an excellent function.[17] A change of 14 points has been considered a clinically important change in people with Achilles tendinopathy.[19]

Potential confounding variables

Factors including participants' demographics (i.e., age, gender, height, and body mass) educational level, employment status, comorbidities, duration of current symptoms, and past experience of physiotherapy treatment may affect pain and disability levels in people with chronic musculoskeletal pain conditions.[7,13] Another potential confounder is variation in the treatment. To obtain a signal of this confounder, participants were asked to provide details about the type of treatment they were receiving (i.e., calf strengthening, heel drops, stretching, plyometrics, manual therapy, dry needling, shockwave therapy, laser, ultrasound, activity modifications, and heel wedge), and whether they had any other health-professional administered treatment (i.e., chiropractic, osteopathy, acupuncture, injections, etc.) or self-interventions (e.g. took medications, purchased orthotics from the pharmacy, etc.) for their Achilles tendon symptoms for the period up to 12-week. Further, information about the treatment status (continuing or cessation of treatment) was collected at 12- and 26-weeks.

Adherence to exercise

At 12- and 26-weeks, patient's adherence to the prescribed exercise was measured by a retrospective patient self-report scale, a simple method that has been implemented by other researchers to measure patient's adherence to the prescribed exercise.[4,28] In response to the question "If you have been requested by your physiotherapist to do exercises at home, please

indicates the extent you have followed the instructions?", participants responded using a 5-item numerical scale from 0 (not at all) to 5 (as advised).

Assessment

Table 2. describes the assessment time points for the variables and clinical outcomes assessed. Each participant received an electronic questionnaire link via email and SMS at baseline, 12- and 26-weeks. Baseline data collection was conducted up to 2 days after the teleconference session. To maximize the response rate at each time point, two reminders (via email and SMS) over a ~7-14 days period, were sent to non-responders kindly asking them to complete the questionnaire. To further enhance the questionnaire response rate and compensate participants for their time and effort, an incentive of $50 (electronic gift card) was provided upon completion of the 12-week questionnaire and another one upon completion of the 26-week questionnaire.

Sample size

Evaluation of feasibility outcomes do not require sample size calculation. However, we powered for simple bivariate Pearson correlations between patient-related factors and clinical outcomes in order to provide a preliminary indication of the relationship between these variables. The sample size was calculated based on a moderate correlation between the variables of interest. To identify a significant correlation coefficient of 0.5, at significance level of 0.05, and power of 80%, the sample size required was 29. This sample size was also considered sufficient to evaluate the feasibility outcomes.

Statistical analysis

Participants' demographics, feasibility outcomes, selected variables, and clinical outcomes were presented using descriptive statistics. The Shapiro-Wilk test was used to evaluate data for the underlying assumption of normality. Descriptive statistics were frequencies and proportions, medians and interquartile ranges or mean and standard deviation, as appropriate. The correlation between selected variables and clinical outcomes at 12- and 26-weeks was investigated using parametric or non-parametric correlation coefficients with 95% confidence intervals, depending on the distributions. The strength of the bivariate correlation coefficients

(absolute value) was interpreted as little or no relationship (0.00 to 0.25), fair relationship (0.25 to 0.50), moderate relationship (0.50 to 0.75), and good relationship (≥ 0.75).[34] Statistical analyses were performed using SPSS software (IBM SPSS Statistics for Windows, Version 26.0, IBM Corp., Armonk, NY, USA).

Results

Baseline demographics data for the entire cohort, and cohort recruited via physiotherapists' referrals and self-registration via social media, separately, are shown in Table 1.

Feasibility outcomes

Rates of conversion, recruitment, and response to questionnaires

The flow of participants through the study is described in Figure 1. One hundred and eleven people registered onto the website between November 2020 to May 2021. Physiotherapists referred 10% (11/111) of registrants. The remaining 90% (100/111) self-registered via social media advertising. The rate of recruitment was 5 per month (30/6 months). Of the one hundred and eleven registrants, 42 were telephoned screened and 34 progressed to teleconference screening. The presence of AT was confirmed in 31 participants, and 30 consented to participate (conversion rate = 30/31 = 97%). All individuals referred from the physiotherapists (n=11) were eligible (100%) versus just 20% from self-registration via social media (n=20/100). Of the 30 included participants, 11 were from physiotherapists' referrals (36%) and 19 were from self-registration via social media advertising (63%). The questionnaire response rate was 100% (30/30) at baseline and 97% (29/30) at both 12- and 26-weeks.

Psychological, cognitive, and contextual factors and clinical outcomes at 12 and 26-weeks

Data for the variables and clinical outcomes at baseline, 12- and 26-weeks are detailed in Table 2. The correlation matrix with 95% confidence intervals for the 12- and 26-weeks is shown in Table 4. At the 12-week, the correlation (Spearman's rho) between the baseline variables (DASS-21, TSK-11, PSEQ, outcome expectations, and WAI-SF) and GRoC ranged between 0.448 to 0.683, and NPRS ranged between 0.316 to 0.549, and VISA-A ranged between 0.225

to 0.473. At the 26-week, the correlation between the baseline variables (DASS-21, TSK-11, PSEQ, outcome expectations, and WAI-SF) and GRoC ranged between 0.034 to 0.284, and NPRS ranged between 0.019 to 0.258, and VISA-A ranged between 0.002 to 0.272. The correlation between baseline NPRS and clinical outcomes at 12- and 26-weeks (GRoC, NPRS, and VISA-A) ranged between 0.243 to 0.511, and 0.232 to 0.527, respectively. The correlation between baseline VISA-A and clinical outcomes at 12- and 26-weeks (GRoC, NPRS, and VISA-A) ranged between 0.189 to 0.482, and 0.143 to 0.445, respectively.

Discussion

Feasibility outcomes

Conducting a full-scale cohort study to investigate the relationship between psychological, cognitive, and contextual factors and clinical outcomes in AT rehabilitation is feasible, provided strategies to increase the recruitment rate are considered. The predefined criteria for feasibility success (recruitment rate of 10 participants or greater per month, a conversion rate of 20% or greater, and response to questionnaires of 80% or greater) have been met except for the recruitment rate that was 50% of our target (5/10 per month). Future cohort studies in the Australian healthcare context need to consider strategies to improve recruitment from physiotherapists. This may include engaging public and private sectors physiotherapists via different avenues (e.g., direct contact with physiotherapists or via physiotherapy research networks such as CAPRI [http://capri-au.com/]).

People with pain in the AT region were recruited online via referrals from the treating physiotherapists and self-registration via social media advertising. Two-thirds (19/30) of consented participants were via our social media strategy and the remaining via physiotherapists' referrals (11/30). To recruit 30 participants in this feasibility study, 34 were screened via teleconference (one time higher than the number recruited). The 11 potential participants referred from the physiotherapists were all eligible and consented to participate. Although recruitment via physiotherapists was slower (1.8 recruited per month versus 3.2 via social media advertising), the screening was less labor-intensive. Recruitment via physiotherapists may have been limited by factors such as clinical practice demands, lacking skill in introducing research participation requests, and the difficulty following enrolment procedures.[10,35]

A high level of response to the questionnaire rate was achieved at all time points. The completion of the questionnaire at baseline was 100%. One participant did not respond to questionnaires at 12- and 26-weeks, resulting in a 97% response rate. Implementation of evidence-based strategies such as reminders, and financial incentives[1,6] may explain the high response to questionnaires rate in the present study.

Psychological, cognitive, and contextual factors and clinical outcomes

According to the preliminary bivariate correlation analysis, there was a fair to moderate correlation between baseline psychological, cognitive, and contextual factors and clinical outcomes in Achilles tendinopathy at 12-week. We found that people that are less depressed and anxious (DASS-21), or have lower kinesiophobia (TSK-11), or greater pain self-efficacy (PSEQ), or stronger working alliance (WAI-SF) with their physiotherapist had significant relationships with the GRoC at 12 weeks. Our results also show that greater pain self-efficacy or stronger working alliance at baseline significantly correlated with all clinical outcomes (GRoC, NPRS, VISA-A) at 12-weeks.

Although the correlation coefficients ranged between 0.225 to 0.683 the lower band of the 95% confidence intervals indicated the relationship strength may be small or negligible (see Table 4 for details). Future trials with larger samples sizes are needed to assess these relationships with greater certainty. Recently, Mallows et. al., (2020) found a fair to moderate correlation between baseline pain self-efficacy ($\rho = 0.650$, $p < 0.05$) and working alliance ($\rho = 0.325$, $p = 0.219$) and the 12-week patient's clinical status measured by Lower Extremity Functional Score, among people with AT.[28] Further confirmation of the correlation between patient-related factors and clinical outcomes in larger-scale cohort studies with multivariable models is warranted.

The correlation between the psychological, cognitive, and contextual factors and clinical outcomes was relatively absent at the 26-week ($\rho = 0.002$ to 0.284). This may be because only 34% (10/30) of patients were still receiving physiotherapy treatment at the 26-week. Or it may be because clinical outcomes (NPRS and VISA-A) did not significantly improve from 12 to 26 weeks (see Table 2 and next discussion for description of clinical outcomes over time). Or it may be that the correlation is not stable over time and/or that the strength of the relationships at 26-week is influenced by other factors. Future cohort studies with larger sample sizes are needed to assess these relationships with greater certainty.

The global rating of change (GRoC) remained relatively constant from 12- to 26-weeks, whilst pain (NRPS) and composite pain, function, and activity score (VISA-A) improved significantly from baseline to 12- and 26-weeks ($p \leq 0.05$). However, the improvement in these two outcomes from 12- to 26-weeks was not statistically significant ($p \geq 0.05$) (see Table 2). Clinically important improvement at 12-week included 52% of patients for NPRS score (≥ 2-point improvement), and 48% on VISA-A (≥ 14-point improvement). At the 26-week, 65% of patients showed clinically important improvement for NPRS score (≥ 2-point improvement), and 62% on VISA-A (≥ 14-point improvement). It is noteworthy that the change (improvement) in VISA-A was lower than the mean reported change in exercise trials for AT in the literature (10-15 points versus 20 points).[14] This may be because of the variability in the treatment delivered (Table 3) which we did not make any attempt to influence in this observational cohort study.

Strengths and limitations

A strength of this study is that we observed the relationships of interest when patients with AT were having treatment in the Australian healthcare system. This means that our findings reflect clinical practice. A larger cohort study adopting these methods could be generalized to the Australian healthcare context. The limitation with this approach is that there were confounders such as the treatment received that may have influenced outcomes and the relationships we were observing. We contend this should not be viewed as a limitation given our aim is to observe the relationship between psychological, cognitive, and contextual factors and clinical outcomes regardless of potential confounders related to treatment received. Information about the prescribed home programs (i.e., exercise type, frequency, and volume) was not collected in this feasibility study. This is a limitation given that home programs could confound the relationships between patient-related factors and clinical outcomes in Achilles tendinopathy. Given this is an exploratory cohort study we chose to investigate bivariate relationships and not to correct the alpha level for multiple comparisons. We utilized teleconference diagnostic screening for Achilles tendinopathy. Although this may be viewed as a limitation, a study by Russell et. al., (2010) demonstrated 93.3% similar agreement between traditional face-to-face and teleconference assessment in diagnosing different ankle disorders including AT.[41]

Considerations for the full-scale study

Despite providing evidence of the feasibility of conducting a full-scale cohort study investigating the relationship between patient-related factors and clinical outcomes in Achilles tendinopathy, there are several considerations prior to the commencement of the full-scale study. First, there is a need to implement strategies to enhance the recruitment rate via physiotherapists to reduce future difficulty of recruitment. Second, information about the prescribed home programs needs to be collected given that it is a potential confounder of the relationships of interest. Third, adherence to the home programs should be measured more frequently (at 6, 12, 20, and 26 weeks) to minimize recall bias. The same patient-related factors, clinical outcome measures, and time-points for assessment will be implemented in the full-scale study.

Conclusion

The predefined criteria for feasibility success in the present study have been met except for the recruitment rate that was relatively low. Conducting a future full-scale cohort study is, therefore, feasible, but consideration must be given to strategies that could enhance the recruitment rate. Preliminary bivariate correlations between baseline psychological, cognitive, and contextual factors and clinical outcomes at 12-weeks warrant further investigations in larger-scale cohort studies.

Clinical message

The preliminary findings suggest that patient-related factors may need to be considered when rehabilitating patients with AT**.**

Declaration of Conflicting Interests

The author(s) declare(s) that there is no conflict of interest.

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Table 1. Participants baseline demographics (median and interquartile Range)

Demographics	Entire cohort (N=30)	Recruited via physiotherapists' referrals (N=11)	Self-registered via social media advertising (N=19)
Age (yrs.)	53 (18)	43 (16)	57 (15)
Gender, number (%F)*	16 (53.3%)	3 (27%)	13 (68.4%)
Height (m)	1.70 (0.2)	1.71 (20)	1.69 (13)
Body mass (kg)	81.50 (24)	79.0 (26)	82.0 (17)

Abbreviations: N: number; F: female, * Frequency (%).

Table 2. Descriptive statistics of variables and clinical outcomes at baseline, 12- and 26- weeks (median and interquartile Range).

Variables and clinical outcomes	Baseline (n=30)	12-week (n=29)	26-week (n=29)
DASS-21	8 (8)	10 (13)	9 (9)
TSK-11	24.50 (6)	24 (7)	23 (8)
PSEQ	50.50 (15)	55 (16)	55 (15)
Outcome expectations	3 (2)	-	-
WAI-SF	50 (13)	49 (16)	51 (14)
GRoC	-	3 (2)	3 (4)
NPRS	5 (4)	3 (3)*	2 (5)*
VISA-A	56.50 (16)	67 (28)*	71 (37)*
Adherence	-	3 (1)	3 (2)
Treatment continuing; n †	-	14 (48%)	10 (34%)
Educational level; n †			
Post-graduate	20 (66%)	-	-
Secondary school	5 (16%)		
Vocational certificate/diploma	5 (16%)		
Primary school	0 (0%)		
Employment status; n †			
Employed or self-employed	24 (80%)	-	-
Retired	3 (10%)		
Other	3 (10%)		
Student	0 (0%)		
Housewife/house husband	0 (0%)		
Unemployed or unable to work	0 (0%)		
Comorbidities; †			
None	9 (30%)	-	-
Hypertension	7 (23%)		
Musculoskeletal conditions	6 (20%)		
Cardiovascular	4 (13%)		
Breathing disorders	3 (10%)		
Cancer/ h.o cancer	2 (6%)		
Others	2 (6%)		
Diabetes	1 (3%)		
Neurological disorders	0 (0%)		
Duration of symptoms; n †			
≤ 3 months	9 (30%)	-	-
3 to 6 months	6 (20%)		
6 to 12 months	5 (16.6%)		
12 to 24 months	2 (6.6%)		
≥ 24 months	8 (26%)		
Participant's physiotherapy experience; n †			
Yes	27 (90%)		
No	3 (10%)	-	-
Previous physiotherapy helpful? n †			
Yes	16 (53%)		
In part	10 (33%)	-	-
No	2 (6.6%)		
NA	2 (6.6%)		

Abbreviations: IQR: Interquartile Range; n: number; † Frequency (%); DASS-21: Depression Anxiety Stress Scale; TSK-11: Tampa Scale for Kinesiophobia-11; PSEQ: Pain Self-Efficacy Questionnaire; GRoC: Global Rate of Change; WAI-SF: Working Alliance Inventory Short-Form; NPRS: Numerical Pain Rating Scale; VISA-A: Victorian Institute of Sports Assessment-Achilles. * Statistically significant difference from baseline ($p \leq 0.05$).

Table 3. Type of physiotherapy and other health professional care

Factor	Category	Number, frequency (%)
Type of physiotherapy care	Calf strength training	30 (100%)
	Heel drops	11 (36%)
	Calf stretching	10 (33%)
	Heel wedge	8 (26.6%)
	Taping	6 (20%)
	Manual therapy	5 (16%)
	Dry needling	5 (16%)
	Plyometrics	4 (13%)
	Activity modifications	4 (13%)
	Heat/cold therapy	4 (13%)
	Shockwave therapy	2 (6%)
	Therapeutic ultrasound	1 (3%)
Other health professionals care	Massage	8 (26.6%)
	Chiropractic	3 (10%)
	Podiatry	2 (6%)
	Osteopathy	1 (3%)
	Acupuncture	1 (3%)
	Medications	3 (10%)
	Braces	1 (3%)

Table 4. Spearman's rho correlation and 95% confidence intervals between baseline variables and clinical outcomes at 12 and 26 weeks

Baseline variables	12-week GRoC	12-week NPRS	12-week VISA-A	26-week GRoC	26-week NPRS	26-week VISA-A
DASS-21	-0.501* (-0.761 ─ -0.146)	0.479* (0.141─ 0.716)	-0.339 (-0.647─ 0.070)	-0.067 (-.458─ 0.311)	0.019 (-0.348─0.373)	0.002 (-0.364─ 0.398)
TSK-11	-0.512* (-0.765─ -0.168)	0.374* (-0.011─ 0.667)	-0.311 (-0.696─ 0.148)	-0.247 (-0.607─ 0.227)	0.194 (-.165─0.491)	-0.231 (-0.594─0.210)
PSEQ	0.500* (0.189─0.752)	-0.417* (-0.692─ -0.067)	0.473* (0.130─ 0.760)	0.054 (-0.379─0.458)	-0.181 (-0.543─0.218)	0.250 (-0.230─ 0.597)
Outcome expectations	0.448* (0.106─ 0.700)	-0.316 (-0.596─ 0.010)	0.225(-0.126─ 0.541)	0.034 (-0.349─ 0.431)	0.052 (-0.318─ 0.391)	0.028 (-0.339─ 0.416)
WAI-SF	0.683* (0.440─0.862)	-0.549* (-0.815─ -0.167)	0.450* (0.079─0.727)	0.284 (-0.135─ 0.638)	-.258 (-0.595─ 0.153)	0.272 (-0.148─ 0.631)
NPRS	-0.243 (-0.572─ 0.150)	0.433* (0.062─ 0.712)	-0.511* (-0.777─ -0.128)	-0.232 (-0.575─ 0.162)	0.527* (0.201─0.734)	-0.496* (-0.793─ -0.040)
VISA-A	0.182 (-0.196─ 0.529)	-0.390* (-0.720─ -0.021)	0.482* (0.072─ 0.792)	0.143 (-0.185─ 0.472)	-0.302 (-0.657─ 0.149)	0.445* (0.049─ 0.732)

Abbreviations: DASS-21: Depression Anxiety Stress Scale; TSK-11: Tampa Scale for Kinesiophobia-11; PSEQ: Pain Self-Efficacy Questionnaire; GRoC: Global Rate of Change; WAI-SF: Working Alliance Inventory Short-Form; NPRS: Numerical Pain Rating Scale; VISA-A: Victorian Institute of Sports Assessment-Achilles.

*Correlation is statistically significant (at level $p \leq 0.05$).

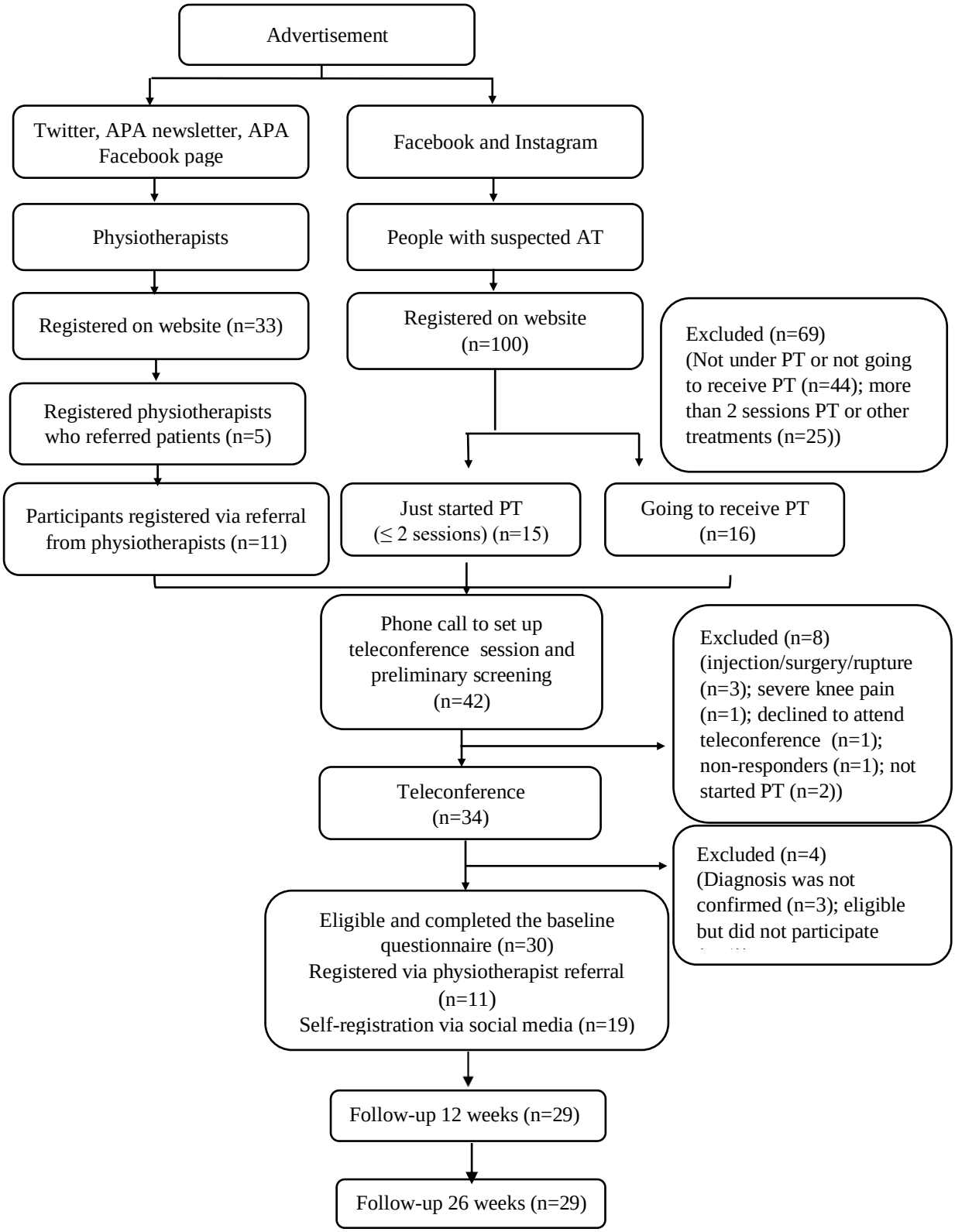

Figure 1. Flow of participants through the study.