

Running head: Psychosocial variables and plantar heel pain

Title: Psychosocial variables and presence, severity and prognosis of plantar heel pain: a systematic review of cross-sectional and prognostic associations

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Abstract

Objective: Plantar heel pain (PHP) is often disabling, and persistent symptoms are common. Psychosocial variables are known to affect pain and disability however the association of these factors with PHP has yet to be established. The purpose of this systematic review was to determine if psychosocial variables are associated with presence, severity and prognosis of PHP.

Methods: A systematic review of the literature and qualitative synthesis was carried out. Electronic searches of MEDLINE, CINAHL, SPORTDiscus, PsycINFO, EMBASE were undertaken from respective databases inception to Nov 2017. Any study design incorporating measurements of psychosocial variables with participants with plantar heel pain were included. The quality of included articles was appraised using the Newcastle Ottawa Scale.

Results: Five articles from four studies were included in the review with a total of 422 participants. Moderate level evidence suggests a clinically unimportant association with incidence of PHP and depression, anxiety and stress, and limited evidence suggests a clinically unimportant association with job dissatisfaction. Moderate level evidence suggests there may be an association of depression, anxiety, stress and catastrophisation and PHP pain, and an association of depression, anxiety, stress, catastrophisation and kinesiophobia and PHP function. There is moderate level evidence that a psychological disorder may be associated with poorer outcome to shockwave therapy.

Conclusion: In light of this review, the association of psychosocial variables and plantar heel pain cannot be ruled out. Given recommendations to adopt an individualised and stratified approach to other MSK conditions, clinicians should remain vigilant to their presence

Key Words

Psychosocial variables; presence: severity; prognosis; plantar heel pain; systematic review

PSYCHOSOCIAL VARIABLES AND PRESENCE, SEVERITY, AND PROGNOSIS OF PLANTAR HEEL PAIN: A SYSTEMATIC REVIEW OF CROSS- SECTIONAL AND PROGNOSTIC ASSOCIATIONS

INTRODUCTION

Plantar heel pain (PHP) is an umbrella term for pain on the plantar aspect of the heel (Riel et al., 2017). The terminology associated with PHP is varied, including plantar fasciitis, plantar fasciopathy and chronic plantar heel pain, which reflects the limited understanding of the pathoetiology of this disorder with suggested inflammatory, degenerative, vascular and neural components (McMillan, Landorf, Barrett, Menz, & Bird, 2009; Rodrigues et al., 2015). Adult foot complaints are common, an Australian survey reported a 17.5% prevalence of foot pain in the general population, with approximately 20% of these respondents reporting heel pain (Hill, Gill, Menz, & Taylor, 2008). PHP is also one of the most commonly reported running injuries, accounting for up to 17.5% of such injuries (Lopes, Hespanhol, Yeung, & Pena Costa, 2012). A UK survey of GP practice found that the foot and ankle conditions accounted for 8% of musculoskeletal consultations, with 7.5% of these being diagnosed as PHP (Menz, Jordan, Roddy, & Croft, 2010). A US study reported approximately one million outpatient healthcare visits per year for the diagnosis and management of PHP (Riddle & Schappert, 2004). The disease is often disabling, and whilst there is evidence of improvement from a range of treatments, persistent or recurrent symptoms are common (Landorf, 2015). A 5-15 year follow up cohort study reported the risk of persistent symptoms at 10 years at 46.5%, with asymptomatic participants suffering symptoms for a mean duration of 725 days (Hansen, Krogh, Ellingsen, Bolvig, & Fredberg, 2018).

The first line management of PHP routinely has a biomedical focus, with multiple healthcare providers involved in the provision of care. Treatments including; stretching, strengthening,

non-steroidal anti-inflammatory drugs, orthotics, activity modification, advice, weight loss, night splints, electrotherapy, corticosteroid injections, extra-corporeal shock wave therapy (ESWT), and platelet rich plasma injections (Landorf, 2015; Martin et al., 2014). Such variety of treatments highlights the limited current understanding of the condition, and also the paucity of high quality randomised controlled trials.

Psychosocial variables, such as depression, anxiety and stress have been shown to affect pain and disability (Jensen et al., 2012; Mallows, Debenham, Walker, & Littlewood, 2016; Vargas-Prada & Coggon, 2015). Pain catastrophisation is the tendency to magnify and ruminate on pain, and kinesiophobia is a fear of movement. Both catastrophisation and kinesiophobia are associated with pain severity and function in knee osteoarthritis (Helminen, Sinikallio, Valjakka, Väisänen-Rouvali, & Arokoski, 2016). In the foot and ankle, a significant association has been demonstrated between anxiety, depression, neuroticism and patients presenting with chronic foot and ankle pain (Awale, Dufour, Katz, Menz, & Hannan, 2016; Shivarathre, Howard, Krishna, Cowan, & Platt, 2014). However, data from these studies refer to generalised foot and/or ankle pain and do not allow for a subset of PHP data to be analysed. A systematic review evaluating the association between psychological variables and tendinopathy reported that psychological variables may be associated and negatively influence outcome in tendinopathy and as such recommended that clinicians should give due consideration to assessing and managing these variables in a multi-dimensional management plan (Mallows et al., 2016). However, a survey of physiotherapy practice in the UK found that the management approaches most routinely used for PHP were advice, education, and general stretching exercises with no reported evidence of psychosocial considerations (Grieve & Palmer, 2016).

To our knowledge, there currently exists no systematic literature review of the evidence examining the cross sectional and prognostic associations of psychosocial variables and PHP. Establishing any association with PHP and psychosocial variables, in terms of presence, severity and prognosis may facilitate an individualised and stratified approach to PHP management. Hence, the aim of this systematic review is to investigate the association between the presence, severity and prognosis of PHP and psychosocial variables.

METHODS

The protocol of this systematic review was registered ([CRD42016046987](#)) and was performed using the predetermined protocol in accordance with the PRISMA statement (Moher et al., 2015).

Data sources and search strategy

An electronic search of MEDLINE, CINAHL, SPORTDiscus, EMBASE, and PsycINFO was undertaken from their inception to November 2017. The search terms used are displayed in table 1. The terms were kept intentionally broad as it was expected that there would be limited studies in this area. Similar search terms and outcomes have been used previously (Mallows et al., 2016). In addition to the electronic search, citation searching and a hand search was carried out of the reference lists of the papers identified and recognised experts in the field of PHP were contacted in an attempt to locate any further studies, published or unpublished, which were not identified in the electronic search. The search was conducted by two reviewers (CD & AM).

Inclusion criteria

Population

Studies recruiting adult participants with a clinical diagnosis of PHP were included. PHP was defined as heel pain on weight-bearing and/or palpation of the plantar heel. Studies of symptomatic participants who did not have a specific diagnosis of PHP were excluded.

Outcomes

The presence of PHP, and of pain and function, measured using patient-reported outcomes (PROS) including Visual Analogue Scales (VAS) (Hawker, Mian, Kendzerska, & French, 2011), the Foot Health Status Questionnaire (Bennett, Patterson, Wearing, & Baglioni, 1998). The presence of psychosocial variables including depression, anxiety, stress, catastrophisation, kinesiophobia, as measured by PROS including the 21-item Depression, Anxiety and Stress Scale short version (Lovibond & Lovibond, 1995), Pain Catastrophizing Scale (Sullivan, Bishop, & Pivik, 1995), Tampa Scale of Kinesiophobia (Kori, Miller & Todd 1995), and health questionnaires.

Study design

Any study design which measured psychosocial variables in people with PHP were included except for narrative reviews, editorials and other opinion-based publications, which were excluded.

Language

There was no language restriction.

Risk of bias assessment

The Newcastle-Ottawa Scale (NOS) was used to assess the quality of the included studies (Wells, Shea, O'Connell, Robertson, Welch, Losos, et al., n.d). It was designed to evaluate

bias based on participant selection, study group comparability, attainment of exposure in case-control studies and outcome of interest in cohort studies. It is a valid and reliable tool for assessing the quality of non-randomised studies, supported by the Cochrane collaboration for quality appraisal of non-randomised trials (Zeng et al., 2015). The NOS uses a 9 star rating system with a maximum of 4 points available for selection, 2 for comparability, and 3 for assessment of the outcome or exposure. The tool was deemed acceptable for the appraisal of cross sectional-studies as the effectiveness of an intervention was not being measured. Quality appraisal of the included articles was undertaken by two authors (CD & AM) and a third author (CW) was consulted in the event of any discrepancy.

Data extraction

All data in this review was initially extracted by a single author (CD) and verified by a second author (AM). Data included study characteristics, participant characteristics, source, sample size, intervention details if applicable, comparison group if applicable, and results. Quantitative data relating to psychosocial outcome measures, pain and function scores were also extracted. Statistical analyses were extracted including Odds Ratios (OR), R², and P-value.

Data synthesis

Due to the heterogeneity in the psychosocial measures used in the studies, a qualitative approach to data synthesis was adopted, informed by the NOS score using levels of evidence (Van Tulder, Furlan, Bombardier, & Bouter, 2003). Qualitative categorisation of “good” or “poor” studies has not been established within the NOS guidance. A scoring system was therefore utilised to rate the evidence and inform the qualitative synthesis. The number of stars awarded to a study were divided by the number of items to determine the score. Pre-

determined methodological cut off points were defined as: 0.00-0.44 low quality, 0.45-0.70 moderate quality, and 0.71-1.00 high quality. This calculation has been utilised previously to determine quality scores (Mallows et al., 2016). Levels of evidence have been adapted and adopted in previous research to grade the strength of observational and cross sectional studies (Mallows et al., 2016). Levels are described as no evidence, conflicting, limited, moderate, and strong, based on the quality and number of studies (table 2).

OR were deemed clinically relevant with ≤ 0.5 or ≥ 2.0 , the P-values of these were included to evaluate strength and significance and were deemed significant where $p \leq 0.05$. (Littlewood, May, & Walters, 2013; McLean, May, Klaber-Moffett, Sharp, & Gardiner, 2010). R² was extracted to explain the variance in the dependent variable and was interpreted as follows; ≤ 0 = poor 0.01 to 0.20 = slight, 0.21 to 0.40 = fair, 0.41 to 0.60 = moderate, 0.61 to 0.80 = substantial, 0.81 to 1.0 = almost perfect (Landis & Koch, 1977).

RESULTS

Study selection

The results of the literature search and study identification process are shown in Figure 1. The initial search identified 426 studies, with no additional studies identified through hand searching or citation searching. Following duplicate removal, 226 studies were screened by title and abstract for relevance. Five articles from 4 studies were included in this review (Chuckpaiwong, Berkson, & Theodore, 2009; Cotchett, Munteanu, & Landorf, 2016; Cotchett, Whittaker, & Erbas, 2015; Cotchett, Lennecke, Medica, Whittaker, & Bonanno, 2017; Werner, Gell, Hartigan, Wiggerman, & Keyserling, 2010).

Newcastle-Ottawa Scale assessment

The quality appraisal of the included articles is shown in Table 3. Four articles were awarded 7 stars and deemed high quality (Chuckpaiwong et al., 2009; Cotchett et al., 2016; Cotchett et al., 2015; Cotchett et al., 2017), and the remaining article was awarded 6 stars and deemed of moderate quality (Werner et al., 2010).

Study Characteristics

The characteristics of the included articles are summarised in Table 4. Five articles from four studies were included with a total of 422 participants (Chuckpaiwong et al., 2009; Cotchett et al., 2016; Cotchett et al., 2015; Cotchett et al., 2017; Werner et al., 2010). There was one cohort (Chuckpaiwong et al., 2009), and four cross sectional observational articles (Cotchett et al., 2016; Cotchett et al., 2015; Cotchett et al., 2017; Werner et al., 2010).

The psychosocial variables measured included depression, anxiety, stress in two articles (Cotchett et al., 2016; Cotchett et al., 2015), catastrophisation and kinesophobia in one article (Cotchett et al., 2017), psychological disorder in one article (Chuckpaiwong et al., 2009), and supervisor support, job dissatisfaction, co-worker support, job insecurity, education level, decision authority in one article (Werner et al., 2010).

Psychosocial variables and the presence of PHP

Depression

There is moderate level evidence from one high quality article of a clinically unimportant association with PHP and depression (OR=1.322, $p=.001$) (Cotchett et al., 2016).

Anxiety

There is moderate level evidence from one high quality article of a clinically unimportant association with PHP and anxiety (OR=1.257, p=.010) (M. Cotchett et al., 2016).

Stress

There is moderate level evidence from one high quality article of a clinically unimportant association with PHP & stress (OR=1.147, p= .003) (Cotchett et al., 2016).

Job dissatisfaction

There is low level evidence from one moderate quality article of a clinically unimportant association with new PHP and job dissatisfaction among assembly plant workers. (OR=1.3, p= .02) (Werner et al., 2010).

Psychosocial variables and the severity of PHP

Pain

Stress

There is moderate evidence from one high quality article that stress explained a slight proportion of variability in foot pain in females ($R^2 = 0.13$, $p = .024$), but was not significant in males ($p = .190$) (Cotchett et al., 2015).

Depression

There is moderate evidence from one high quality article that depression explained a slight proportion of variability in foot pain in females ($R^2 = 0.16$, $p = .013$) but was not significant in males ($p = .829$) (Cotchett et al., 2015).

Catastrophisation

There is moderate evidence from one high quality article that catastrophisation explained a

fair proportion of variability in first step pain ($R^2 = 0.29$, $p = .008$) (Cotchett et al., 2017).

Function

Stress

There is moderate evidence from one high quality article that stress explained a fair proportion of variability in foot function in females ($R^2 = 0.29$, $p = .001$), but was not significant in males ($p = .929$) (Cotchett et al., 2015).

Depression

There is moderate evidence from one high quality article that depression explained a fair proportion of variability in foot function in females ($R^2 = 0.25$, $p = .001$), but was not significant in males ($p = .326$) (Cotchett et al., 2015).

Kinesiophobia

There is moderate evidence from one high quality article that kinesiophobia explained a fair proportion of variability in foot function ($R^2 = 0.26$, $p = .006$) (Cotchett et al., 2017).

Catastrophisation

There is moderate evidence from one high quality article that catastrophisation explained a moderate proportion of the variability in foot function ($R^2 = 0.43$, $p < .001$) (Cotchett et al., 2017).

Psychosocial variables and prognosis in PHP

Psychological disorder

There is moderate evidence from one high quality article of a clinically important association with psychological disorder and poorer outcome to ESWT than those without a documented psychological disorder (OR 0.161, $p < .05$) (Chuckpaiwong et al., 2009).

Discussion

Previous systematic reviews for PHP have focused on risk factors , (Irving, Cook, & Menz, 2006; van Leeuwen, Rogers, Winzenberg, & van Middelkoop, 2015) and to date, no previous systematic review has evaluated the association of psychosocial variables. Overall, this systematic review found significant heterogeneity between articles in terms of specific psychosocial variables and associated outcome measures. This heterogeneity precluded a meta-analysis of the data being carried out. The association between psychosocial variables and incidence of PHP appears to be of a clinically unimportant size. This is based on moderate evidence from one high quality article of a clinically unimportant association with PHP and depression, anxiety and stress, (Cotchett et al., 2016) and limited evidence from one moderate quality article of a clinically unimportant association with new PHP and job dissatisfaction among assembly plant workers (Werner et al., 2010). Sub analysis between pain, PHP and psychosocial variables revealed moderate evidence from one high quality article that stress and depression explained a slight proportion of variability in foot pain in females but this was not significant in males (Cotchett et al., 2015). There is also moderate evidence from one high quality article that catastrophisation explained a fair proportion of variability in first step pain (Cotchett et al., 2017). Additional sub-analysis between function, pain and psychosocial variables has shown moderate evidence from one high quality article that stress and depression both explained a fair proportion of variability in foot function in females, but this was not significant in males (Cotchett et al., 2015). There is also moderate

evidence from one high quality article that kinesiophobia explained a fair proportion, and that catastrophisation explained a moderate proportion, of the variability in foot function (Cotchett et al., 2017). Examination of the association between psychosocial variables and prognosis of PHP, indicates there is moderate evidence from one high quality article of a clinically important association with psychological disorder and poorer outcome to shockwave therapy than those without a documented psychological disorder (Chuckpaiwong et al., 2009). This is in keeping with previous research of an association of psychological variables and personality traits with foot pain, depression, anxiety and somatisation in low back pain, and anxiety, depression, kinesiophobia, and distress in tendinopathy (Awale et al., 2016; Bener et al., 2013; Mallows et al., 2016; Shivarathre et al., 2014).

Although this systematic review includes all available studies, the results and conclusions that can be made are somewhat limited by the individual sample sizes and the number of included studies. For example, when the data was stratified by sex, stress and depression explained slight to fair variability in severity of foot pain and function respectively in females not males (Cotchett et al., 2015). This gender difference was not significant in similar research looking at catastrophisation and kinesiophobia and PHP, (Cotchett et al., 2017) or the other studies in this review. Larger prospective studies are warranted to determine whether there is a true gender effect. Furthermore, further well designed prospective studies are warranted to confidently determine the significance of associations between PHP and psychosocial variables and how such information might inform treatment pathways for people reporting PHP. All of the articles reported statistically significant findings, however the clinical importance of the results varied, with the largest effect size being the association of psychosocial variables and PHP function (Cotchett et al., 2015; Cotchett et al., 2017).

In addition to methodological variations, the uncertainty of findings may also be explained by the inconsistency in the diagnostic criteria for PHP (Cutts, Obi, Pasapula, & Chan, 2012).

Three articles defined PHP as symptoms for one month or longer, first step pain during the previous week rated at least 20 mm on a 100 mm visual analog scale (VAS) (Cotchett et al., 2016; Cotchett et al., 2015; Cotchett et al., 2017). One article defined PHP as moderate or severe foot pain lasting more than one week or occurring at least three times in the past year with tenderness to palpation at the plantar fascia insertion, (Werner et al., 2010) which is in keeping with other research (van Leeuwen et al., 2015). The remaining article, defined chronic PHP as being painful heel symptoms lasting longer than 6 months (Chuckpaiwong et al., 2009). Lack of robust criteria for clinical diagnosis limits comparison between studies and makes it difficult to determine if PHP sub-groups exist and whether one such sub-group is influenced more so by psychosocial variables. Research aimed at identifying sub-classifications of PHP, similar to that seen in low back pain, (Nijs et al., 2015) could help bring clarity to a nebulous condition.

The presence of confounding variables has the potential to affect the studied variables and therefore the results may not accurately reflect a true relationship. The articles included in this review made varying attempts to control confounding variables, most consistently age, gender and body mass index through multivariate analysis. The variance in controlled variables between studies is understandable, due to the complexity and uncertainty regarding the pathaetiology of PHP, however this variance means confounding anatomical, biomechanical and environmental confounders cannot be excluded from influencing the relationship and affecting the generalisability of the results. Further research into these areas will help bring clarity to the significance of individual confounders, and may help standardise the variables controlled for in future studies.

Whether psychosocial variables may impact presence, severity, and prognosis or whether having PHP may influence psychosocial variables remains unclear. The nature and design of the current studies do not allow for causation to be inferred and it would be prudent at this

stage to have suspicion that there is likely to be a two-way interaction between psychosocial variables and PHP. This review highlights the need for further prospective investigations which should include psychosocial factors alongside biomechanical, anatomical and environmental factors. This would help determine and rate with confidence the influence of these factors in PHP, and how they may or may not interact with each other.

Conclusion

Overall, this review found significant heterogeneity between studies in terms of psychosocial variables and outcome measures. This limits the pooling of data and the conclusions which can be drawn from it. Moderate level evidence suggests a clinically unimportant association with presence of PHP and depression, anxiety and stress, and limited evidence suggests a clinically unimportant association with job dissatisfaction. Moderate level evidence suggests there may be an association of depression, anxiety, stress and catastrophisation with PHP pain, and an association of depression, anxiety, stress, catastrophisation and kinesiophobia with PHP function. There is moderate level evidence that a psychological disorder may be associated with poorer outcome to shockwave therapy than those without a documented psychological disorder.

In light of the results from this review, the association of psychosocial variables and PHP cannot be ruled out. Given recommendations to adopt an individualised and stratified approach to other MSK conditions, clinicians should remain vigilant to their presence. There is a need for further well designed prospective studies to confidently determine the significance of these associations and how such information might, or might not, inform treatment pathways for people reporting PHP.

List of abbreviations

ESWT: Extra-corporeal shock wave therapy

NOS: Newcastle-Ottawa Scale

OR: Odds ratios

PHP: Plantar heel pain

PROS: Patient reported outcome measures

VAS: Visual analog scale

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Tables

Table 1 Key search terms used in the study selection process

Search Terms	
1	Plantar heel pain OR Plantar fasci* OR heel pain syndrome
2	Depression OR Anxiety Or Stress OR Psychosocial OR Psycholog*
3	1 & 2 Combined

Table 2: Levels of evidence

Strong—consistent findings among multiple high quality studies
Moderate—consistent findings among multiple low quality studies or one high quality study
Limited—one low quality study
Conflicting—inconsistent findings among multiple studies
No evidence—no studies

Table 3

Author/ Year	Selection	Comparability	Exposure/ Outcome	Total Stars	Quality of study
Chuckpaiwong et al (2009)	***	**	**	7	High
Cotchett et al (2017)	***	**	**	7	High
Cotchett et al (2016)	***	**	**	7	High
Cotchett et al (2015)	****	*	**	7	High
Werner et al (2010)	**	**	**	6	Moderate

Table 4 Study characteristics

Study characteristics	Participants characteristics	Intervention	Psychosocial variable	Outcome measures	Incidence	Pain	Function	Prognosis
<p>Chuckpaiwong et al (2009) A cohort study.</p> <p>Aim to evaluate the clinical effectiveness of shock wave therapy for the treatment of chronic PHP and to assess factors that influence the outcome of this treatment.</p> <p>Bangkok, Thailand.</p>	<p>Two hundred and twenty five participants (246 feet) who underwent consecutive ESWT treatment Male feet n= 74 Female feet n= 172 The mean age of the participants was 48.8 years. Painful heel symptoms for 6 months or longer; and failure to respond to at least 5 conservative modalities.</p>	Single shockwave therapy treatment session	Documented psychological disorder	Health questionnaire. (*)	n/a	n/a	n/a	Clinically important association with psychological disorder and poorer outcome to shockwave therapy (OR 0.161, $p < .05$)
<p>Cotchett et al (2017)</p> <p>Cross sectional, observational study</p> <p>The aim of this study was to evaluate whether catastrophisation and kinesiophobia, were associated with foot pain and foot function in people with PHP</p>	<p>Thirty six participants with PHP, aged 18 years or older. Male n=16 Female n=20. Mean age of 47.3 years. Clinical diagnosis of PHP: for 1 month or longer, first step pain during the previous week rated at least 20 mm on a 100 mm visual analogue scale</p>	n/a	Catstrophisation and kinesiophobia	Pain Catastrophising Scale, Tampa Scale of Kinesiophobia, the Foot Health Status Questionnaire and a Visual Analogue Scale.	n/a	Catastrophisation explained a fair proportion of variability in first step pain ($R^2 = 0.29$, $p = .008$).	<p>Kinesiophobia explained a fair proportion of variability in foot function ($R^2 = 0.26$, $p = .006$).</p> <p>Catastrophisation explained a moderate proportion of the variability in foot function ($R^2 = 0.43$, $p = .000$).</p>	n/a

Victoria, Australia.	(VAS),							
<p>Cotchett et al (2016)</p> <p>Cross sectional, observational study</p> <p>Aim to evaluate the association between depression, anxiety, and stress with PHP</p> <p>Part of a randomised controlled trial that evaluated the effectiveness of trigger point dry needling for PHP</p> <p>Victoria, Australia.</p>	<p>Forty-five participants with PHP were matched by sex and age to 45 participants without PHP</p> <p>PHP Male n=23 Female n = 22 .Mean age of 53. Clinical diagnosis of PHP: for 1 month or longer, first step pain during the previous week rated at least 20 mm on a 100 mm visual analogue scale (VAS),</p>	n/a	Depression, anxiety, and stress	21-item Depression, Anxiety and Stress Scale short version (DASS-21)	<p>Clinically unimportant association with PHP & Depression (OR 1.322, p= .001)</p> <p>Clinically unimportant association with PHP & Anxiety (OR 1.257, p=.010)</p> <p>Clinically unimportant association with PHP & stress (OR 1.147, (p= .003)</p>	n/a	n/a	n/a
<p>Cotchett et al (2015)</p> <p>Cross sectional, observational study</p> <p>The aim of this study was to evaluate whether symptoms of depression, anxiety and stress are associated with foot pain and foot function in</p>	<p>Eighty-four participants with PHP, aged 18 years or older. Participants had a mean age of 56.1. Male n=43 Female n = 41. Clinical diagnosis of PHP for symptoms 1 month or longer; first step pain</p>	n/a	Depression, anxiety and stress	Depression, Anxiety and Stress Scale short version (DASS-21) Pain and function items of Foot Health Status Questionnaire (FHSQ)(**)	n/a	<p>Stress explained a slight proportion of variability in foot pain in females (R2= 0.13, p=.024), but was not significant in males (p=.190).</p> <p>Depression explained a slight proportion of variability in foot pain in females (R2= 0.16, p= .013) but was not significant in</p>	<p>Stress explained a fair proportion of variability in foot function in females (R2= 0.25, p=.001), but was not significant in males (p=.929).</p> <p>Depression explained a fair proportion of variability in foot function in females (R2 0.25, p=.001), but was not</p>	n/a

people with PHP Part of a randomised controlled trial that evaluated the effectiveness of trigger point dry needling for PHP Victoria, Australia.	during the previous week rated at least 20 mm on a 100- mm visual analogue scale (VAS)					males ($p=.829$)	significant in males ($p=.326$).	
Werner et al (2010) A cross-sectional observational study The objective of this study was to determine the relative contributions of work activity, floor surface characteristics, weight, body mass index, age, foot biomechanics, and other demographic and medical history factors to the prevalence of PHP Michigan, USA	407 Participants. PHP $n= 32$. Male $n=20$ Female $n=12$ PHP defined as moderate or severe foot pain lasting more than 1 week or occurring at least 3 times in the past year and experienced tenderness to palpation at the insertion of the plantar fascia on the calcaneus, New PHP was defined as a worker with pain in the foot related to palpation of the plantar fascia at the calcaneus	n/a	Supervisor support , job dissatisfaction, co-worker support , job insecurity , education level, decision authority	Questionnaire	Clinically unimportant association with new PHP and job dissatisfaction. (OR= 1.3, $p=.02$),	n/a	n/a	n/a

	who did not report a history of plantar fasciitis in their medical history.							
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*No further information was identified on this outcome measure.

** FSHQ where 0 is worst foot health and 100 is best.

Figure Legend

Figure 1: Study Flow Diagram