



# Perspectives of patients and health professionals on the experience of living with psoriatic arthritis-related foot problems: a qualitative investigation

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## Abstract

**Objective** The aim of the study was to explore how foot problems impact on the lives of people with psoriatic arthritis by interviewing patients and health professionals.

**Method** Participants were recruited from outpatient rheumatology clinics in Sydney, Australia, and in Auckland, New Zealand, using a convenience sampling strategy. People with psoriatic arthritis were asked questions in semi-structured interviews about their foot problems and the impact they have on daily living until qualitative data saturation. Focus groups were undertaken with health professionals to explore their understanding of the patient experience of psoriatic arthritis-related foot problems. All interviews were audio-recorded and transcribed verbatim. Constant comparative analysis was used to identify emerging themes from the data.

**Results** Twenty-one people with psoriatic arthritis-related foot problems and 17 health professionals participated. Three overarching key themes were derived from patients and health professionals: (1) structural and functional foot manifestations, (2) impact on daily life leading to social withdrawal and reduced work productivity and (3) mediating factors influencing the severity of impact from foot problems on their lives such as social support, self-management strategies and experiences of health care.

**Conclusion** Foot problems caused functional disability and altered self-concept, which lead to a cascade of social, economic and psychological consequences. People with foot problems contend with profound disruption to their functioning and life roles. Whilst health professionals recognised the functional and visual impact that foot problems have on daily life, the emotional burden may be under-appreciated. Future work to determine the scale and types of foot problems in psoriatic arthritis is required.

**Keywords** Foot · Interviews · Podiatry · Psoriatic arthritis · Qualitative

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## Introduction

Psoriatic arthritis (PsA) is a chronic inflammatory musculo-skeletal disease associated with psoriasis [1] and is characterised by a wide clinical spectrum and a variable course [2]. Clinical features of PsA, such as peripheral arthritis, enthesitis, dactylitis and tendinopathy, as well as skin and nail psoriasis, can affect the feet [3–6]. Previous studies have described the structural and functional changes in the foot affected by PsA [3–5, 7–10]. However, the details of how foot problems impact on the lives of people with PsA, their experiences with footwear and their foot care needs are limited.

Previous studies have assessed the perspectives of patients and clinicians regarding the whole effect of PsA, confirming that it has a demonstrated detrimental effect on health-related quality life [11–13]. One study found that pain in the feet was the fourth most prevalent single

complaint, behind tiredness, arm pain and lower back pain [14]. This suggests that, for a large proportion of people with PsA, foot involvement may be the major characteristic feature of their disease. However, the specific consequences of PsA on foot functional impairment and disability have not been explored in detail. Obtaining the patient's perspective on how they feel and function with respect to their disease and the clinician's view has been recognised as critically important in the assessment and management of PsA [13, 15–17]. The aim of this study was to explore how foot problems impact on the lives of people with PsA by interviewing patients and health professionals.

## Participants and methods

Participants with PsA were recruited from rheumatology outpatient clinics in Sydney, Australia, and Auckland, New Zealand. Health professionals with clinical experience of managing people with PsA, including podiatrists, physiotherapists and rheumatologists, were recruited to take part in focus groups. Participating sites were selected to provide a representative sample from public and private sector, from lower and higher socioeconomic geographical areas and to provide local data from Australia and New Zealand. Ethical approval was granted by the South Western Sydney Local Health District (HREC/171/LPOOL/353), the Auckland University of Technology Ethics Committee (AUTEC 17/320) and the Waitemata District Health Board of Auckland New Zealand (RM/3907). Both participants and health professionals provided written informed consent prior to data collection.

Participants with rheumatologist-diagnosed PsA, aged over 18 years old and who had current or previous experience of foot problems were recruited by their rheumatologist in Australia and New Zealand. Those who could not read or speak English or those with cognitive impairment precluding ability to answer health-related questions accurately were excluded. Convenience sampling was used to recruit people with PsA for semi-structured interviews. Semi-structured, one-to-one interviews were used to gain a rich description of their individual experiences of foot problems and their impact. This technique was selected as participants tend to be more inclined to disclose personal information in face-to-face interviews and with the researcher being able to respond accordingly [18].

Focus groups were selected as the method of data collection to explore the views of health professionals. Group dynamics and interactions are distinct features of this method, used to generate rich data [19]. It was anticipated that health professionals who work together would be able to contribute freely to a group discussion. Exploring the patient experience from the perspective of health professionals facilitates further

insight into the impact of foot problems reported by people with PsA.

The interview guides (Supplementary Material 1) were developed based on a review of related literature [13, 20–26]. The interview guides were designed to cover specific areas of interest, which included (1) foot involvement in PsA, (2) its impact on daily life, (3) experiences with footwear and (4) foot care needs. The interview guides used open-ended questions to encourage detailed descriptions. Additional probes were used to facilitate discussion and to maintain the focus on foot problems. All interviews and focus groups were conducted by the same researcher (KC), a podiatrist with 15 years of clinical experience.

## Procedure

Prior to interview, participant demographic information was collected including age, gender, ethnicity and occupation. Clinical characteristics were recorded including body mass index, disease duration, comorbidities, current medications, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). Activity limitation was measured using the Health Assessment Questionnaire (HAQ) [27] that includes 20 tasks for which participants are asked to rate their ability to perform them over the last week (without difficulty = 0, some difficulty = 1, much difficulty = 2 or unable to do = 3). Global disease activity over the last week was measured using a 100-mm Visual Analogue Scale (VAS) with the assessment of both joint and skin components, joint alone and skin alone. Global pain was also measured using a 100-mm VAS.

Foot functional impairment and disability was assessed using the Foot Impact Scale (FIS) [20]. The FIS (FISTOTAL) is a self-completed questionnaire comprising 51 items in total, divided into two subscales: impairments/shoes (FISIF) and activities/participation (FISAP). FISIF scores  $\leq 6$  represent mild, 7–13 moderate and  $\geq 14$  severe levels of foot-related impairment. FISAP scores  $\leq 9$  represent mild, 10–19 moderate and  $\geq 20$  severe levels of activity limitation [28]. Severity of foot pain on the day and over the last week were measured using a 100-mm VAS. Previous and current foot or lower leg ulceration, previous foot surgery and having previously seen a podiatrist were recorded.

Data recorded from the health professionals prior to the focus groups included demographic information, professional qualifications and number of years of clinical experience. All interviews and focus groups were audio-recorded and transcribed verbatim immediately after each session. Recruitment to the study continued until qualitative data saturation of emerging concepts was achieved [29]. Data was collected between October 2017 and March 2018.

### Data analysis

All demographic and clinical data were described as mean (SD) for continuous data and n (%) for categorical data. Qualitative data were analysed using a constant comparative method [30] and a thematic framework approach to facilitate conceptual mapping [31]. ATLAS-ti version 7.5.7 software (Scientific Software Development GmbH, Berlin, Germany) was used to analyse the data ([www.atlas-ti.com](http://www.atlas-ti.com)). The researcher (KC) read each transcript several times and meaningful units within the data such as words, phrases and concepts were assigned codes, framed by the researcher’s focus of inquiry. This method combines inductive category coding with a simultaneous comparison of all units of meaning obtained. The codes were continuously refined, compared and subsequently grouped with similar units of meaning and then organised into themes [30]. The emergent themes were scrutinised and agreed by the research team to increase analytical rigour. The conceptual framework of themes was verified by both participants and health professionals (Fig. 1).

### Results

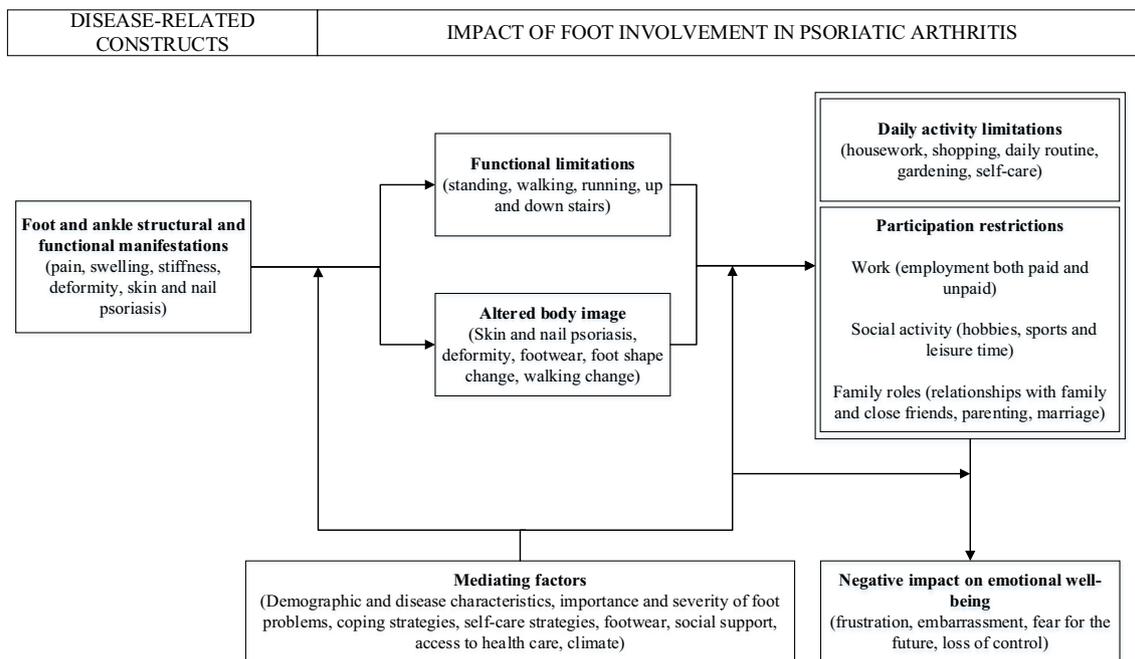
Participant demographic and clinical data are summarised in Table 1. Twenty-one people with PsA and self-reported foot involvement were recruited, the majority of which were women (62%, n = 13). The mean (SD) age was 53 (13) years and the mean (SD) disease duration was 11 (9) years. The HAQ

found mild overall activity limitation with a mean (SD) of 1.0 (0.5). Moderate levels of global disease activity were reported for joints and skin, joints alone and skin alone. Seven participants with elevated CRP levels had global assessment scores greater than 70 mm.

All participants had experienced previous foot pain (n = 21, 100%) and over 80% (n = 17) of participants had current foot pain (Table 2). The mean (SD) of the FISIF was 12 (4) and the FISAP was 18 (7) indicating moderate levels of foot impairment and activity limitation. Over half of participants had previously seen a podiatrist (n = 11, 52%).

The demographic characteristics of the health professionals are shown in Table 3. Three focus groups were undertaken and a total of 17 health professionals participated, 12 from Australia and 5 from New Zealand. The majority of focus group participants were rheumatologists (n = 10, 59%), working in the public sector (n = 7, 70%), with over 15 years of clinical experience managing this patient group (n = 6, 35%). The other focus group members were rheumatology registrars (n = 2, 12%) and allied health professionals (n = 5, 29%). The mean (SD) number of years of clinical experience amongst the allied health professions was 13 (6) years. The interviews and focus groups lasted approximately 45 to 60 min.

Three overarching themes emerged from the analysis of interviews of people with PsA and focus groups with health professionals (Table 4). Exemplars from the transcripts were identified to support each of the themes (Supplementary Material 2). People with PsA will be referred to as participants and health professionals will be identified as health professionals.



**Fig. 1** The conceptual framework of themes. The manifestations of psoriatic arthritis in the feet and ankles (theme 1) caused foot functional impairments and visual differences that impacted on daily activities,

social participation, work productivity and family life (theme 2). Mediating factors (theme 3) influenced the severity of impact from foot involvement on the lives of people with psoriatic arthritis

**Table 1** Demographic and clinical characteristics of participants with psoriatic arthritis ( $n = 21$ )

Variables	Value
Ages, years	53 (13)
Women, $n$ (%)	13 (62%)
Ethnicity, $n$ (%)	
Caucasian	18 (86%)
Fiji-Indian	2 (10%)
Indian	1 (5%)
Body mass index, $\text{kg}/\text{m}^2$	32.1 (7.4)
Geographic location, $n$ (%)	
Sydney, Australia	18 (86%)
Auckland, New Zealand	3 (14%)
Employment status, $n$ (%)	
Employed	6 (29%)
Unemployed (health reason)	8 (38%)
Unemployed (other reason: student, home-maker)	2 (10%)
Retired	5 (24%)
Disease type, $n$ (%)	
Psoriatic arthritis with skin psoriasis	19 (90%)
Psoriatic arthritis without skin psoriasis	2 (10%)
Disease duration, years	11.2 (9.1)
Medications, $n$ (%)	
Methotrexate	11 (52%)
Other DMARD (leflunomide, salazopyrin, hydroxychloroquine)	12 (57%)
Biologics	7 (33%)
Prednisone	1 (5%)
Other medications, $n$ (%)	
NSAID	15 (71%)
Opioid	3 (14%)
Other pharmacological treatment	16 (76%)
Comorbidities, $n$ (%)	
Cardiovascular conditions	14 (67%)
Musculoskeletal conditions	12 (57%)
Depression	3 (14%)
Diabetes mellitus	9 (43%)
Cancer	4 (19%)
HAQ score	1.0 (0.5)
CRP, $\text{mg}/\text{L}^{*1}$	7.0 (7.1)
ESR, $\text{mm}/\text{h}^{*2}$	20.5 (15.6)
Patient global disease activity (joint and skin) VAS (VAS 0–100), mm	52 (24)
Patient global skin disease activity VAS (VAS 0–100), mm	43 (31)
Patient global joint disease activity VAS (VAS 0–100), mm	56 (28)
Patient global pain VAS (VAS 0–100), mm	49 (28)

Data presented as mean (SD) unless specified

DMARD disease modifying anti-rheumatic drug, NSAID non-steroidal anti-inflammatory drugs, VAS visual analogue scale, ESR erythrocyte sedimentation rate, CRP C-reactive protein

\*<sup>1</sup>  $n = 12$  participants had a recent CRP result, \*<sup>2</sup>  $n = 11$  participants had a recent ESR result

**Table 2** Foot and ankle characteristics and footwear type of participants with psoriatic arthritis ( $n = 21$ )

Variables	Value
Previous foot pain, $n$ (%)	21 (100%)
Presence of current foot pain, $n$ (%)	17 (81%)
Current foot pain VAS (VAS 0–100), mm*	43 (29)
Foot pain over the last week VAS (VAS 0–100), mm*	49 (24)
Previous foot or lower leg ulceration, $n$ (%)	3 (14%)
Current foot or lower leg ulceration, $n$ (%)	0 (0)
Previous foot surgery, $n$ (%)	3 (14%)
Has seen a podiatrist before, $n$ (%)	11 (52%)
Foot impact scale	
FIS <sub>TOTAL</sub> score	30 (10)
FIS <sub>IF</sub> subscale score	12 (4)
FIS <sub>AP</sub> subscale score	18 (7)
Type of footwear worn on the day of the interview, $n$ (%)	
Walking shoe (lace-up shoe, sports shoe)	8 (38%)
Sandal (contoured)	3 (14%)
Sandal	2 (10%)
Sketchers (slip-on shoe)	2 (10%)
Thong	2 (10%)
Thong (contoured)	1 (5%)
Backless slipper	1 (5%)
Therapeutic sandal	1 (5%)
Other	1 (5%)

Data presented as mean (SD) unless specified

VAS visual analogue scale, FIS<sub>TOTAL</sub> Foot Impact Score total, FIS<sub>IF</sub> Foot Impact Score foot impairment/footwear restriction, FIS<sub>AP</sub> Foot Impact Score activity limitation/participation restriction

\* $n = 20$  (two participants did not fully complete the questionnaire in different sections)

## Overarching theme 1—foot and ankle structural and functional manifestations of PsA

Pain was the most commonly reported symptom and the main descriptors for the nature of foot pain were ‘persistent’ and ‘unpredictable’. The duration of current foot pain ranged from 3 months to 5 years. Foot pain severity varied according to the time of day and the level of priority given to the feet within the context of their whole experience of living with PsA. Pain was exacerbated mostly by walking and pressure from footwear, but also by changes in the weather and increased global disease activity and body weight. All participants experienced some foot pain during or following walking activity.

Musculoskeletal involvement in the feet was reported by all participants and health professionals, which included arthritis, enthesitis (Achilles enthesitis and plantar fasciitis), tendinopathy (tibialis posterior and peroneal tendons), bursitis (retro-calcaneal and intermetatarsal) and dactylitis. Variable clinical presentations of foot pain were described

**Table 3** Demographic characteristics of the health professionals with experience of managing people with psoriatic arthritis (*n* = 17)

Variables	Value
Age, years	44 (8)
Women, <i>n</i> (%)	9 (53%)
Ethnicity, <i>n</i> (%)	
Caucasian	12 (71%)
Chinese	4 (24%)
Indian	1 (6%)
Occupation, <i>n</i> (%)	
Rheumatologist	10 (59%)
Rheumatologist registrar	2 (12%)
Podiatrist	3 (18%)
Physiotherapist	1 (6%)
Rheumatology care coordinator	1 (6%)
Clinical experience, years	12 (8)
Qualifications, <i>n</i> (%)	
Bachelor of Medicine (MBBS)	11 (65%)
Fellow of the Royal Australasian College of Physicians (FRACP)	9 (53%)
Bachelor of Science (BSc)	10 (59%)
Master of Science (MSc)	2 (12%)
Doctor of Philosophy (PhD)	6 (35%)
Geographical location, <i>n</i> (%)	
Sydney, Australia	12 (71%)
Auckland, New Zealand	5 (29%)
Health sector, <i>n</i> (%)	
Public sector	13 (77%)
Private sector	4 (24%)

Data presented as mean (SD) unless specified

by the health professionals, but the most common were deemed to be related to localised inflammation, mechanical dysfunction or a ‘mixed’ type presentation and were described within the context of disease duration. Toenail psoriasis was commonly reported and over a quarter of participants reported having skin psoriasis that affected their lower legs, soles of the feet, tips of the toes or in between the toes. For 2 participants, plantar skin psoriasis was their most troublesome foot problem.

**Table 4** Key themes emergent from the interviews of people with psoriatic arthritis and focus groups with health professionals

No.	Overarching themes	Sub-themes
1.	Foot and ankle structural and functional manifestations of PsA	Foot pain, swelling, stiffness, foot cramp, numbness, hot and cold sensations, joint deformity and skin and toenail changes
2.	The impact of foot problems on the lives of people with PsA	Body image, physical function, daily activity, social, family and work life
3.	Mediating factors that influenced the severity of impact of PsA-related foot problems	Demographic and disease characteristics, importance and severity of foot problems, self-management strategies, footwear, climate and social and health care support

One third of participants reported that their feet were the first site affected by PsA and 9 participants described that their feet were the most severely affected site compared with symptoms elsewhere in the body. Self-reported foot manifestations at disease onset were dactylitis, plantar skin psoriasis, metatarsophalangeal joint synovitis, ankle joint synovitis, tibialis posterior tendinopathy, plantar fasciitis and Achilles enthesitis.

**Overarching theme 2—the impact of foot problems on the lives of people with PsA**

Six impact areas were identified as sub-themes including altered body image, functional limitations, daily activity limitations, social participation restrictions, family and work life restrictions. Health professionals described the impact of foot problems on the lives of people with PsA as ‘incapacitating’, ‘disturbing’, ‘debilitating’, ‘really impossible’, ‘disaster’, ‘psychologically distressing’ and ‘a nightmare’.

**Altered body image** Change to the physical appearance of the feet and footwear restrictions, regardless of the social context, had a negative impact on body image. Participants felt demoralised and stigmatised by the appearance of their feet relating to skin and toenail changes, swelling, deformity and the visible changes to their gait. Strategies to hide the appearance of foot problems included the non-disclosure of their disease to others, closed-in footwear, clothes to cover, disuse of walking aids and limiting social participation. Increased body weight attributed to foot pain that impeded exercise revealed the far-reaching effects of PsA-related foot involvement.

**Functional limitations** Foot problems had an impact on the ability to sit, stand, walk and function normally for all participants. Foot pain and stiffness was described by all participants in relation to the time of day, their activity level and with either maintaining or changing body positions. Walking disability was attributed to a variety of foot problems including pain, stiffness, swelling, plantar skin psoriasis, corns and calluses, toe deformity, ankle surgery and uncomfortable

footwear. Functional limitations included being unable to walk barefoot, short or long distances and being unable to run, as well as difficulty walking on uneven ground, up-hill or down-hill and up or down stairs. Changes to the spatiotemporal parameters of gait were described as walking slower, limping, shuffling, hobbling and feeling unstable on their feet. Pain avoidance behaviour was associated with all functional limitations and dictated life choices.

**Daily activity limitations** Most participants were limited in their ability to undertake their daily routine because of the structural and functional manifestations of PsA in the feet and ankles. Participants described how they had stopped, modified or reduced the frequency of household tasks such as shopping, cleaning, cooking, gardening and home maintenance. Sleep and driving were also reported to be affected, as maintaining or changing position increased the severity of foot symptoms. Not having the physical capacity to undertake basic foot care activities was a concern for some participants and was reported by the health professionals, which included maintaining foot hygiene, nail cutting, skin care and taking shoes/socks on and off. Comorbid diseases such as obesity, PsA-related axial involvement and of the shoulder, hips and hands also interfered with the ability to self-care.

Some participants explained how they felt ‘stuck at home’ (confined and isolated), which was associated with pain avoidance behaviour but also with stress, frustration, decreased motivation and a sense of ‘losing control’. Many statements about daily activity limitations revealed negative emotions such as anxiety, bad temper, depression, embarrassment, helplessness and low self-worth. These feelings were reinforced by the perception that others do not understand and might be forming judgements about them. Existing coping strategies included accepting limitations, stoicism, pacing and planning. Most pushed themselves to undertake daily activities despite the foot pain either because of necessity or to maintain a sense of control. A limited range of coping strategies (accepting limitations and stoicism) and emotional states (frustration and fear for the future) were reported by the health professionals suggesting a potential under-appreciation of the psychological impact of foot involvement on the daily lives of people with PsA.

**Social participation restrictions** The majority of participants reported difficulty socialising, maintaining friendships and taking part in leisure activities due to foot problems. Functional limitations and negative body image had a profound impact on social participation. The exacerbation of foot symptoms during and after the social activity reduced their enjoyment and motivation, which consequently led to social withdrawal. Fear of foot injury also led to a disruption of social activities involving the use of public transport, going to concerts, dancing and walking through crowds.

**Family life impact** Spending time with family was disrupted due to foot symptoms and functional limitations. Participants described how being pre-occupied with pain altered their mood, which led to a loss of enjoyment and negative interactions. An increased reliance on family members for physical and emotional support was identified and parents specifically talked about fearing a deterioration in their functioning and becoming a burden. Those participants who had a family member with psoriasis, PsA or other inflammatory arthropathies described a greater level of understanding about the disease by family members and felt generally better informed about their own disease. Conversely, 4 participants who reported that they were the only family member with PsA associated it with a sense of isolation and fear for the future. Enduring foot pain in favour of social and family participation and hiding pain from others was frequently reported by participants, but these strategies were not recognised by the health professionals.

**Work life impact** Severe foot-related disability directly contributed to the loss of paid work in 4 participants. Whilst the health professionals did not identify the full impact of the disease on family and social life, they described the devastating impact of long-term work disability with most citing the provision of documentation to employers. Of the 6 participants who were in employment, all experienced some difficulty performing their job roles because of foot pain and stiffness, which related to taking longer to get to work, managing to travel to and from work sites, prolonged sitting at a desk and being slower at completing work tasks. Footwear restrictions negatively impacted on job roles (i.e. with the inability to wear smart business shoes or safety boots), walking activities and social participation including special occasions such as weddings. Difficulties with footwear were related to skin and toenail psoriasis, swelling, deformity and a wider/bigger foot shape, which triggered foot pain, discomfort and rubbing in shoes. Difficulty finding shoes that were comfortable, well fitting, supportive and nice looking were frequent experiences, which provoked feelings of dread, embarrassment, frustration and envy.

### **Overarching theme 3—mediating factors that influenced the severity of impact from foot problems on the lives of people with PsA**

There was evidence of a unique combination of situations and experiences for each participant that facilitated or impeded their ability to influence the severity of impact from PsA-related foot involvement on their daily life. These mediating factors were considered to be intrinsic or extrinsic to the individual. Characteristics such as demographic (age, gender, ethnicity and socioeconomic status), disease (disease onset, duration, course and activity and morbidity), foot and ankle

(perceived importance and severity of foot problems) and psychological (coping strategies and emotional well-being) were considered as intrinsic factors. Social support (availability of help from family, friends and employers), self-care strategies (effectiveness of non-pharmacological interventions including footwear), climate (influencing foot symptoms and footwear choice) and health care support (access to health care and effectiveness of medical management) were considered as extrinsic factors. The interface between these mediating factors was considered to determine the ability of the participant to decrease or minimise the impact of PsA-related foot involvement.

Health professionals associated younger age, female gender, lower socioeconomic status, later disease diagnosis, longer disease duration and high disease course variability with a greater severity of foot disease impact. The severity of foot problems and the level of importance attributed to them were considered to influence the participant's emotional well-being (sadness and frustration) and their ability to cope (accepting and adapting), which consequently affected the severity of impact on daily life. Effective self-management strategies included positive coping skills, the ability to self-care, readily available social support, finding suitable footwear and accessing health care. Stoicism was the most commonly identified coping mechanism used by participants when describing their foot disease burden. Five participants reported that they found it easier to confide in people with PsA due to a mutual understanding of the experience and one participant found it beneficial to attend a local arthritis support group. With six participants receiving regular podiatry treatment, the majority engaged in self-care activities with variable levels of effectiveness and expenditure. The ability to self-manage foot problems and reduce foot symptoms to a certain extent was associated with a sense of relief and control.

A mix of good and bad experiences were reported by participants and health professionals in relation to footwear. A few participants described that their footwear choice had improved their mobility and reduced foot pain. Closed-in shoes helped to hide foot problems, protected feet from injury and kept feet warm, whilst open shoes helped improve skin psoriasis, were easier to get on and off and kept feet cool. Footwear restrictions along with the resultant loss of clothes choice due to foot problems had a greater severity of impact on women, who harboured feelings of shame and judgement. Climate-related footwear difficulties increased the severity of impact of foot problems on body image, functioning and participation.

Previous health care experiences and the level of satisfaction with and effectiveness of foot disease management appeared to influence all aspects of a participant's lived experience. Accessing health care led to empowering relationships with health professionals and improvements to foot symptoms and functioning for some participants. Improved understanding of foot manifestations and knowledge of non-

pharmacological foot care interventions appeared to have a positive influence on reducing the impact of foot problems. Participants who reported disappointing experiences with health care services described diagnostic delay in those presenting at onset with foot problems, a lack of understanding about foot involvement by health professionals and by themselves, unmet expectations of treatment benefit and dissatisfaction with the limited scope of podiatry care received. These concepts were consistent with comments made by the health professionals who discussed in detail their patients' experiences of suboptimal foot disease management.

## Discussion

This is the first study to explore the impact of foot and ankle problems on people with PsA from Australia and New Zealand by interviewing patients and health professionals. PsA is associated with musculoskeletal disability [32], reduced health-related quality of life [33] and incurs a high socioeconomic burden [34]. This study highlights the specific contribution of foot involvement to the disease burden in PsA, which can be spread across core disease domains [13] such as pain, physical function, economic cost, emotional well-being and participation. The complex nature of the manifestations of PsA in the foot and ankle was subsequently mirrored in the multifaceted functional impairments and activity limitations experienced by participants. This qualitative study revealed that people with PsA experienced difficulties with foot problems from symptom onset, through to diagnosis and management. Our findings show how suffering with debilitating and uncontrollable foot symptoms can impact on the lived experience of an individual and how important it can be to gain back control by adopting positive self-management strategies and making empowered decisions. In routine health care consultations, people with PsA may not have the opportunity to describe in-depth the impact of foot problems on their lives. As a result, the burden may not be properly appreciated by health professionals.

This study provides preliminary insight and understanding of the impact of PsA-specific foot involvement from the perspective of people with PsA and health professionals. Previous studies have linked domains of impact in PsA from qualitative studies to the International Classification of Functioning (ICF) framework to allow the effect of PsA to be structured and categorised [12, 35]. Concepts relevant and important to people with PsA-related foot problems have been identified and linking them to the ICF would help to define what should be measured in the evaluation of foot disease burden. Establishing a core set of foot-specific measures would inform a standardised assessment of the foot in PsA, representing the work supported by the GRAPPA (Group for Research and Assessment of Psoriasis and

Psoriatic Arthritis) [12]. Further research will be to use the ICF classification to describe the impact of foot involvement in PsA based on the current study findings.

The impact of foot problems in PsA described in this study appears to be similar to those reported in other foot-related rheumatic conditions such as altered body image [36, 37], reduced functional capacity and participation [23, 26, 38], footwear restrictions [37–39] and suboptimal standards of foot care [23, 38, 40, 41]. However, in contrast to other rheumatic conditions, foot involvement in PsA remains under-researched and poorly understood with a lack of large-scale data needed to develop targeted disease-specific interventions. Future work will be to develop a survey in order to obtain information about foot involvement from a wider range and number of people with PsA across Australia and New Zealand, which includes different regions (rural and urban) and climate zones (temperature and humidity). Improving our understanding of foot involvement in PsA and its impact will also help to inform the development of a PsA-specific outcome measure to assess foot involvement.

Limitations of this study included a convenience sampling strategy, as participants who volunteered to take part in the study may not be representative of all people with foot involvement in PsA or the health professionals who have insight into their experiences. However, both people with PsA and health professionals were invited from different socioeconomic geographical locations and health care settings within the study regions to ensure that a wider range of opinions were collected. The study sample was considered to reflect the epidemiology of PsA and is comparable with other PsA studies [42, 43]. Foot problems from comorbidities such as diabetes and obesity remains a factor in determining their relative contribution to symptoms and functioning. Therefore, findings from this study may be subject to bias as confounding variables were not adjusted for. However, eliminating the impact of comorbidities comes at the expense of external validity and loss of generalisability in a real-world context.

In conclusion, people with PsA contend with profound disruptions to their functioning and self-image due to foot problems, the effects of which are wide-reaching and spread across all aspects of life. Health professionals may underappreciate the psychological impact of living with foot problems related to PsA.

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**Compliance with ethical standards** Ethical approval was granted by the South Western Sydney Local Health District (HREC/171/LPOOL/353), the Auckland University of Technology Ethics Committee (AUTECH 17/320) and the Waitemata District Health Board of Auckland New Zealand (RM/3907). Both participants and health professionals provided written informed consent prior to data collection.

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