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## Illness beliefs and walking behaviour after revascularisation for intermittent claudication - a qualitative study --Manuscript Draft--

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<b>Abstract:</b>	<p><b>Purpose</b> Patients with Peripheral Artery Disease are recommended to increase physical activity to reduce cardiovascular risk. Vascular intervention (surgery or angioplasty) treats the symptom (intermittent claudication), but not the underlying cardiovascular disease. This study aims to explore the beliefs and physical activity behaviour of patients with Peripheral Artery Disease who have received vascular intervention.</p> <p><b>Methods</b> Twenty participants who had received a vascular intervention for intermittent claudication between 6 months and 2 years previously participated in semi-structured interviews. The interviews explored illness and treatment beliefs and walking behaviour. Data were transcribed verbatim and analysed thematically.</p> <p><b>Results</b> Participants described a high level of ongoing symptoms (particularly pain) in their legs, despite having received vascular intervention. They viewed their illness as acute and treatable, and believed pain was an indication of walking causing damage. They controlled their symptoms by avoiding walking and slowing their pace. Participants were generally unaware of the causes of the disease, and were unaware of their increased risk of future cardiovascular health problems. There was a low level of congruence between participants' beliefs about their illness and the recommendation to increase physical activity which may affect physical activity behaviour.</p> <p><b>Conclusions</b> Our findings suggest that patients with Peripheral Artery Disease do not change</p>

	physical activity behaviour after diagnosis and treatment, because they hold dysfunctional and incongruous beliefs about Peripheral Artery Disease, treatment, and physical activity.
<b>Response to Reviewers:</b>	<p>I have made the following changes:</p> <ol style="list-style-type: none"><li>1. To Title Page:<ol style="list-style-type: none"><li>a. I have added the country (Scotland) to the address of the 5th author.</li></ol></li><li>2. To Manuscript:<ol style="list-style-type: none"><li>a. I have included a description of where the study took place (two regional urban hospitals in Scotland).</li><li>b. I have changed the format of the in-text references.</li><li>c. I have used accepted journal abbreviations in the reference list.</li></ol></li></ol> <p>Thank you for accepting this paper for publication in the Journal of Cardiopulmonary Rehabilitation and Prevention.</p> <p>Yours sincerely,</p> <p>Maggie Cunningham PhD</p>

**Illness beliefs and walking behavior after revascularisation  
for intermittent claudication – a qualitative study**

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## **STRUCTURED ABSTRACT**

**PURPOSE:** Patients with peripheral artery disease (PAD) are recommended to increase physical activity to reduce cardiovascular risk. Vascular intervention (surgery or angioplasty) treats the symptom (intermittent claudication), but not the underlying cardiovascular disease. This study aims to explore the beliefs and physical activity behavior of patients with PAD who have received vascular intervention.

**METHODS:** Twenty participants who had received a vascular intervention for intermittent claudication between 6 months and 2 years previously participated in semi-structured interviews. The interviews explored illness and treatment beliefs and walking behavior. Data were transcribed verbatim and analysed thematically.

**RESULTS:** Participants described a high level of ongoing symptoms (particularly pain) in their legs, despite having received vascular intervention. They viewed their illness as acute and treatable, and believed pain was an indication of walking causing damage. They controlled their symptoms by avoiding walking and slowing their pace. Participants were generally unaware of the causes of the disease, and were unaware of their increased risk of future cardiovascular health problems. There was a low level of congruence between participants' beliefs about their illness and the recommendation to increase physical activity which may affect physical activity behavior.

**CONCLUSIONS:** Our findings suggest that patients with peripheral artery disease do not change physical activity behaviour after diagnosis and treatment, because they hold dysfunctional and incongruous beliefs about PAD, treatment, and physical activity.

## **CONDENSED ABSTRACT**

Interviews were conducted with 20 patients who had previously received vascular intervention for peripheral artery disease. Thematic analysis revealed patients do not change physical activity behavior after diagnosis and treatment because they hold dysfunctional and incongruous beliefs about peripheral artery disease, treatment, and physical activity.

1 Intermittent claudication (IC) is a common symptom of peripheral artery disease (PAD),  
2 characterized by cramping leg pain when walking, which relieves upon rest. PAD is a  
3 prevalent chronic condition which affects ~10% of adults over 50 years, and ~19% of adults  
4 over 70 years.<sup>1</sup> PAD is usually caused by atherosclerosis, and indicates systemic  
5 atherosclerosis. International guidelines for the treatment of PAD recommend risk factor  
6 management through patient behavior change, in particular smoking cessation, weight loss,  
7 and increased physical activity.<sup>2</sup> However, rates of angioplasty to treat the symptoms of  
8 claudication have dramatically increased in recent years.<sup>3</sup>

9  
10 Typically, success of vascular intervention for IC is measured by walking capability  
11 in treadmill tests or with self-report quality of life questionnaires. These measures do not give  
12 an understanding of patient actual day-to-day physical activity behavior after  
13 revascularization; however, there is evidence that people with PAD walk significantly less  
14 than other older adults.<sup>4,5</sup> Current treatment, including vascular intervention, supervised  
15 exercise programs, and ‘go home and walk’ advice, do not change physical activity behavior  
16 of PAD patients.<sup>6-10</sup> As PAD typically involves multiple sites throughout the arteries, patient  
17 behavior change is important alongside vascular intervention to improve health and reduce  
18 the risk of cardiovascular comorbidity and mortality. Physically inactive patients with IC  
19 have twice the mortality risk of moderately physically active (1 to 3 hours per week moderate  
20 physical activity) patients over 5 years, suggesting that even low levels of physical activity  
21 would be beneficial for patients with IC.<sup>11</sup> The Common-Sense Model of self-regulation of  
22 health and illness (CSM) is a popular concept which has been used to understand modifiable  
23 determinants of behavior in a number of chronic diseases.<sup>12,13</sup>

24  
25 The CSM proposes that when faced with disease symptoms, patient behavior is  
26 influenced by their beliefs about the illness and their beliefs about treatment. The CSM  
27 proposes that these beliefs determine the cognitive and behavioral actions which the

1 individual will take to cope with the illness and improve health. The objective of this study  
2 was to explore the beliefs and physical activity behavior of patients with peripheral artery  
3 disease who have received vascular intervention.  
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## 9 **METHODS**

10 Semi-structured interviews were conducted with participants in their own homes. Interview  
11 transcripts were analysed using Thematic Analysis.<sup>14</sup> Participants were recruited from  
12 vascular outpatient clinics in 2 regional urban hospitals in Scotland. The local NHS Research  
13 Ethics Committee approved this study.  
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### 24 **Participants and Procedure**

25 Consecutive patients attending vascular outpatient clinics following angioplasty or bypass  
26 surgery were invited to participate in the study. Inclusion criteria included an original  
27 diagnosis of IC, and revascularization surgery or angioplasty between 6 months and 2 years  
28 previous to recruitment. This time scale was a pragmatic choice to reduce the risk that  
29 participants were still experiencing the short-term effects of surgery (6 months), and so that  
30 participants were captured before discharge from followup (2 years). Potential participants  
31 were excluded from the study if they were unable to speak English, had a psychiatric illness  
32 or were known to be taking part in other studies. Sample size was determined by minimum  
33 sample size (10 participants) and stopping criteria (no new information identified from  
34 preceding 3 interviews).<sup>15</sup> The final sample had 20 participants.  
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51 Informed consent was taken prior to the interview commencing. Interviews were  
52 conducted by a researcher trained in qualitative methods and interviewing techniques.  
53 Interviews were taped and transcribed verbatim and their accuracy checked against the  
54 original tapes. The interviews followed an interview schedule guided by the study aims to  
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1 explore participant physical activity behavior and beliefs about their illness, with questions  
2 based on the CSM. This model proposes that people form lay illness beliefs which contain  
3 information about the identity of the illness, the temporal features of the illness, the imagined  
4 and real consequences of the illness, the causes of the illness, and beliefs about whether the  
5 illness can be cured or controlled.<sup>12</sup> The interview included the open questions: Can you tell  
6 me all about what has happened with your legs? What are your current symptoms? What do  
7 you believe caused the peripheral artery disease (problems in your legs)? What do you think  
8 will happen to your health in the future? How can you control your peripheral artery disease?  
9 How have you changed your health behaviors since the operation? How active are you on a  
10 typical day? Can you describe what kind of walking you usually do? What are the advantages  
11 or disadvantages of doing more physical activity? Participants were also asked to describe  
12 what they believed happened inside their leg to cause the walking pain. Probing questions  
13 were posed as necessary during the interview in response to issues raised by participants.  
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### 31 **Analysis**

32 The interview transcripts were analysed using thematic analysis,<sup>14</sup> which is a common form  
33 of qualitative analysis. Our analysis was concerned with the experiences, meaning, and  
34 reality of participants. We took a theoretical approach to thematic analysis, coding the  
35 interview transcripts in relation to the specific aims of the study, ie, focusing on the beliefs  
36 and physical activity behavior of participants.  
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48 Two researchers, a psychologist and exercise physiologist, conducted independent  
49 initial analysis of the transcripts - familiarization with the data, initial code generation, and  
50 searching for initial themes. The researchers read and re-read the transcripts fully in order to  
51 form a sense of the whole interview (familiarization). The transcripts were then searched  
52 systematically for statements related to the study aims (beliefs and physical activity behavior  
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1 of participants). Coding was performed manually by marking relevant statements with a  
2 highlighter and assigning a brief descriptive label for each statement in the transcript margins  
3 (initial code). All data sets were coded, and then statements were collated together under each  
4 code in a separate notebook. Initial codes were then sorted into subcategories by grouping  
5 statements with similar meaning, and these were reviewed between the researchers. The  
6 researchers discussed initial coding decisions and subcategory groupings in detail, with the  
7 goal of reaching consensus. There was a high level of agreement between the researchers of  
8 subcategories identified in the analysis. The researchers then worked together to discuss,  
9 agree and refine the final themes, by grouping and integrating inter-related subcategories. The  
10 researchers then re-read the interviews and considered whether the individual final themes  
11 accurately reflected the meaning in the interviews. Each theme represented a pattern of  
12 meaning identified in the set of interviews which related to the aims of the study. The  
13 analysis was therefore deductive in that it focused on the specific aims of the study. A  
14 vascular surgeon independently reviewed the transcripts, checking his agreement with the  
15 coding of the themes.  
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## 39 RESULTS

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41 Of the 25 patients invited to participate, 3 declined to take part in the study and 2 participants  
42 failed to attend interviews, therefore 20 interviews were conducted. Participant characteristics  
43 are shown in Table 1.  
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47

48 Five themes were identified in the analysis, which help to explain the physical activity  
49 behavior and illness and physical activity beliefs of patients with IC after they have received  
50 vascular intervention. These themes are described in the following section.  
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### 58 Walking Avoidance

1 While most participants were aware that they should be trying to walk, no participants had a  
 2 clear understanding of how much walking they should be doing, the recommended intensity  
 3 of walking, or critically, the mechanism by which walking would improve their health.  
 4  
 5 Despite having received vascular intervention, the majority of participants felt they couldn't  
 6  
 7 exercise because of the pain they experienced when walking, loss of confidence in their  
 8  
 9 walking abilities, the feeling that their legs had lost power, and because they tired very  
 10  
 11 quickly when they tried to walk. As a result of claudication pain, most participants had given  
 12  
 13 up trying to exercise.  
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19 Male, 73 *Again it just comes down to the walking, so you can't exercise as*  
 20  
 21 *much. I mean even going round the shopping centre, you cannae, I*  
 22  
 23 *mean you've just got to stop and rest.*  
 24  
 25  
 26

27 Critically, participants did not view walking as a potential treatment for their IC. Participants  
 28  
 29 avoided walking into the claudication pain, worrying that the pain was an indication of  
 30  
 31 damage to the leg. While avoidance is a natural reaction to pain, claudication pain does not  
 32  
 33 cause damage – this highlights the incongruity between participant perception of pain, and  
 34  
 35 the reality of the disease.  
 36  
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 38

39 Male, 68 *I'm scared of walking in case I damage my legs.*  
 40  
 41

42 Participants generally had a limited understanding of the reason why they experienced leg  
 43  
 44 pain when walking. Although some participants understood that they had a narrowing in their  
 45  
 46 circulatory system, they did not understand how this caused pain when walking.  
 47  
 48  
 49

50 Female, 72 *It's a vein. I've got a lot of wee veins. I've been led to believe the vein's*  
 51  
 52 *narrowed. I don't know how it's causing the pain.*  
 53  
 54

55 Other participants had no understanding of what happened within their leg to cause leg pain.

56 Female, 66 *The pain starts in the foot and works its way up my legs and into my*  
 57  
 58 *hips and then my back. I've no idea why.*  
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1 Female, 70 *Maybe like an oil change in a car, the older you get it's maybe needing*  
 2 *renewed ken, like your blood supply, ken? I don't know. I don't know.*  
 3

4  
 5 When asked about the advantages of doing more physical activity, participants responded in  
 6  
 7 terms of tasks or activities they would like to be able to do, rather than with disease-specific  
 8  
 9 benefits. No participants mentioned the potential for symptom reduction, or development of a  
 10  
 11 collateral blood supply as an advantage of increased physical activity.  
 12  
 13

14 Male, 73 *Well, I'd like to be able to go to the fishing, things like that. I cannae*  
 15 *dae that now. I used tae dae a lot of walking. The legs wouldnae be up*  
 16  
 17 *to it, nae, nuh, nuh.*  
 18  
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 20  
 21

22 Participants adapted to having limited mobility by changing the way they spent their leisure  
 23  
 24 time, giving up hobbies which involved physical activity and instead finding hobbies where  
 25  
 26 they didn't need to walk. By reducing their physical activity levels, and slowing their pace,  
 27  
 28 participants avoided experiencing pain.  
 29  
 30

31 Male, 81 *I don't really go out. I stay in and watch the telly.*  
 32  
 33

34 Male, 77 *I never got another dog, because I wasnae fit to take him walks, wi' my*  
 35  
 36 *legs. I never got another dog. That's the first time I've been without a*  
 37  
 38 *dog all my life....*  
 39  
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#### 44 **Treatable Condition**

45  
 46 Participants viewed their illness as acute and treatable, rather than a chronic condition which  
 47  
 48 required self-management. Patients focused solely on the symptom (IC) rather than the  
 49  
 50 disease (PAD). Despite having received vascular intervention all participants reported having  
 51  
 52 current symptoms including claudication pain, swelling, tightness, throbbing, numbness,  
 53  
 54 cramps at night, problems bending the knee and nerve damage, although symptoms varied  
 55  
 56 greatly in severity. While some of these symptoms are attributable to PAD, others occur as a  
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1 result of surgery, and this indicates the participants may have had unrealistic expectations  
 2 about vascular intervention, and lack of knowledge about the consequences of surgery.  
 3

4  
 5 Several participants spoke about the lack of information they were given about their  
 6 postoperative health, especially their lack of knowledge about what to do about nerve damage  
 7 and swelling after surgery. Participants generally viewed the pain as something which they  
 8 hoped could be treated by further surgical intervention or which would disappear magically  
 9 with time – critically, they did not feel there was anything they could do to improve their  
 10 symptoms or disease.  
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18  
 19 Male, 58 *I wanted the operation thinking obviously this was going to cure it.*  
 20

21  
 22 Female, 70 *So I'm hoping and praying that (the surgeon) will be able to cure me.*  
 23

24  
 25 Female, 72 *I'll just take it a day at a time, and see what happens. So I feel, well, if*  
 26 *it happens it happens, what can I do, eh? But eh, I just hope it doesn't*  
 27 *get any worse. Hopefully it'll go away.*  
 28  
 29  
 30

31  
 32 Participants viewed surgeons as the gatekeepers over treatment and control of claudication  
 33 symptoms. Participants originally received a diagnosis of PAD from vascular surgeons, and  
 34 this appears to have triggered their acute belief system that surgical intervention was the  
 35 standard treatment and cure for their symptoms.  
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### 43 **Causal Beliefs**

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 45  
 46 Participants cited a wide variety of factors which they felt had caused their PAD. The main  
 47 cause mentioned by participants was smoking, 14 of the 17 (82%) participants who were  
 48 either current or past smokers, mentioned smoking as a possible cause of their disease.  
 49  
 50

51  
 52 However, several participants mentioned that they were reporting this as a cause because  
 53 their doctor had told them that smoking was a cause, but indicated that they did not  
 54 necessarily believe this:  
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1 Female, 65 *It's cos of this (waves cigarette). Well, that's what they said anyway.*

2 Female, 72 *Well, they say the smoking. I mean, I don't know.*

3  
4  
5 Only 1 participant had quit smoking as a result of being diagnosed with PAD. Participants  
6  
7 had no clear conceptual framework which explained how, eg, smoking could cause calf pain.  
8  
9 This was especially the case when there was a time lag between ceasing the causal behavior  
10  
11 and onset of claudication symptoms.  
12

13  
14 Female, 66 *I've given up (smoking) for 5 year. So, it's not the smoking any more*  
15  
16 *(causing the PAD).*  
17  
18

19 Several participants said that they had no idea what had caused their disease. Of this group,  
20  
21 some were or had been smokers, and some had diabetes – they had risk factors for the disease  
22  
23 but were not aware of this:  
24

25  
26 Female, 70 *I've no idea, that's what I'm saying I just wondered if the metformin*  
27  
28 *for the diabetes had anything to do with it? I don't know... I don't*  
29  
30 *know. As I say, I thought maybe the medication had something to do*  
31  
32 *with it.*  
33  
34  
35

36 Several participants felt that some form of physical activity had caused their claudication  
37  
38 symptoms. Lack of physical activity is a risk factor for developing IC, however, it is logical  
39  
40 that patients with poor understanding of the circulation system may develop the belief that  
41  
42 physical activity is the cause of their muscle pain.  
43  
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45  
46 Male, 70 *Right, I had 2 dogs, 3 actually, and I used to take them a walk every*  
47  
48 *day and every night, I always walked them. So I don't know whether*  
49  
50 *that could have been it, maybe going out in the damp weather, I used to*  
51  
52 *go out in all weather, you know? And I don't know whether that caused*  
53  
54 *it, you know?*  
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1 Later in the interview, this participant went on to describe how he had given up his dog  
 2 because he did not feel able to take it for walks due to the leg pain. The participant model of  
 3 his illness was logical and coherent (to him) and clearly led to his choice of behavior-  
 4 nonadherence to walking advice, ie, walking had caused his illness, therefore it would be  
 5 illogical to walk now.  
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### 11 **Perceived Consequences**

12 Participants were not concerned about the implications of PAD and atherosclerosis to their  
 13 general health. No participants mentioned any concern or awareness about their risk of stroke  
 14 or heart trouble. Concerns for future health were instead around whether or not participants  
 15 would be offered or would require further vascular intervention for their legs. Participants  
 16 saw symptoms and disease as being one and the same thing, they believed they had a disease  
 17 in the legs and they had no concept of the broader cardiovascular risks from generalized  
 18 atherosclerosis. For those who had not been offered further vascular intervention, there was  
 19 concern about what would happen to their mobility in the future.  
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36 Female, 66 *Well, I'm actually thinking I might end up in a wheelchair, you know?*  
 37  
 38 *And I would hate for that to happen.*  
 39  
 40

41 Participants feared that a consequence of claudication would be increasing dependence on  
 42 family for help with transport, shopping and housework, due to reduced mobility.  
 43  
 44

45 Male, 63 *Well, I'm not getting any younger, I'm 63 year old. I hate to think my*  
 46 *legs would ever get that bad, and my son, would have to look after me,*  
 47 *I don't want that, you know what I mean? Sometimes I think my whole*  
 48 *life's went, I cannae walk, I just sit in the house.*  
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### 56 **Surgeon Patient Communication**

1 A number of participants commented that they did not understand the complicated, technical  
 2 language used in surgical consultations; that consultations were rushed; and that they were  
 3 unable to question surgical staff. These factors contributed to making several participants feel  
 4 that they were not clear why decisions had been made.  
 5  
 6  
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8  
 9 Male, 65 *And when I was in the last time he (surgeon) was talking to a lady*  
 10 *doctor and he said I was needing more but he started talking funny*  
 11 *words that I didnae understand.*  
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17 This was especially the case for participants who were suffering claudication pain, but had  
 18 had no further procedures offered - they did not understand why.  
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 21

22 Female, 78 *At that point he said he didn't think there was really too much they*  
 23 *could do, where it was or something. He showed me all the x-rays, I*  
 24 *tried to look intelligent (laughs). I said "oh well, you know, fair*  
 25 *enough.*  
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31 Surgical consultations were the main source of support and information for participants about  
 32 PAD. There did not appear to be any congruence between participant understanding of PAD  
 33 and the circulation system, and that of the surgeons. This could mean that although surgeons  
 34 give patients information about PAD and treatment options (including physical activity), the  
 35 patient cannot process the information in a way which is meaningful to them, reducing the  
 36 likelihood that the patient will change their behavior.  
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46 Female, 72 *he seemed to know that this pain going up here is to do with the blood.*  
 47 *But I didnae feel he explained it very well to me on Monday. He seemed*  
 48 *to know exactly what I was saying, but there's nothing they can do. He*  
 49 *said "There's nothing I can actually do, because it's it's up there", he*  
 50 *sort of pointed up at my stomach. I felt he didnae really explain it*  
 51 *clearly.*  
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## DISCUSSION

From this qualitative interview study we found that patients with PAD continue to experience significant symptoms, including claudication pain, after receiving vascular intervention for IC. Patients with PAD have dysfunctional beliefs about their illness and about walking. In particular, patients with PAD viewed their illness as an acute, curable condition, which was the responsibility of health professionals; they did not appreciate the long-term health implications of PAD. Although many participants were aware they should be exercising, they had negative outcome expectations of walking, believing that walking was too painful, may damage their legs, and they lacked confidence in their ability to walk, therefore they tended to slow down and avoid exercise.

The Common-Sense Model of self-regulation of health and illness (CSM) suggests that whether or not people change health behaviour when faced with illness is influenced by their beliefs about the illness and their beliefs about treatment.<sup>12</sup> Coherence between an individual's illness beliefs and their beliefs about possible treatment is thought to be a key issue in self-regulation.<sup>12</sup> Weinman et al found that when patients did not have congruence between their illness and treatment representations, they did not undertake that treatment.<sup>13</sup> We identified a number of areas of incongruence between patient beliefs about their illness, and beliefs about treatment, including communication from surgeons, and recommendations to increase physical activity. Our study suggests that the dysfunctional beliefs of patients after revascularisation leads to suboptimal coping actions which directly contravene evidence-based treatment guidelines, including avoiding exercise, reducing walking and slowing pace.

Participant causal beliefs were often incongruent, with some participants seeming to underestimate the role of smoking in the development of PAD. Yong et al found older smokers tend to underestimate the harm of smoking, believe smoking had not damaged their

1 health and believe medical evidence against smoking is exaggerated compared to younger  
2 smokers.<sup>16</sup> Only 1 participant in this study had quit smoking as a result of diagnosis with  
3 PAD. Smoking cessation interventions for patients with PAD should target these incongruent  
4 beliefs about smoking. Validity and reliability was increased by following strategies outlined  
5 to increase the rigor of qualitative healthcare research,<sup>17,18</sup> including having a clearly  
6 described process of analysis; peer debriefing through the presentation of methods and  
7 findings to relevant health professionals; and having more than one researcher involved in  
8 analysis. The sample represented patients who had all been treated for claudication with  
9 either angioplasty or surgery. Previous qualitative research into the experience of coping with  
10 PAD has not been theory based and has included patients with different levels of severity of  
11 PAD, and at different stages of treatment.<sup>19-23</sup>

26 This study does however have some limitations. Participants were recruited from  
27 outpatient clinics, therefore there was a risk that we might miss the chance to recruit patients  
28 who had no ongoing leg problems or who had very poor health if they had failed to attend the  
29 clinic. However, scrutiny of the 'did not attend' list against the inclusion criteria by the  
30 vascular assessment nurse at each relevant clinic determined that all patients who met the  
31 inclusion criteria attended clinics on the days when recruitment for the study was taking  
32 place. All patients are followed up at clinics for at least 2 years after revascularization.  
33 The interview questions specifically explored the physical activity behavior and beliefs of  
34 participants. There may be other factors which influence the health behaviour of patients  
35 which were not covered by the interview.

## 53 CONCLUSIONS

54 The management of PAD should aim to reduce cardiovascular risk factors in order to achieve  
55 secondary prevention of both leg and other serious cardiovascular complications, in particular  
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1 myocardial infarction and stroke, and promote durable outcomes of endovascular/surgical  
2 interventions. Our findings suggest that patients with PAD do not change physical activity  
3 behaviour after diagnosis and treatment for IC, because they have dysfunctional and  
4 incongruent beliefs about PAD, treatment, and health behaviors.  
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9 Patients currently receive encouragement to change health risk behaviours in  
10 consultations with health professionals, however, the information is not integrated into the  
11 individual's framework of how they view their illness or their understanding of the  
12 circulation system. This may be due, at least in part, to rushed consultations and the technical  
13 language used. Further research is warranted to study how health professionals currently  
14 approach health risk behavior change in patients with PAD, and the barriers and facilitators to  
15 changing health risk behavior in this patient group.  
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## 28 **ACKNOWLEDGEMENTS**

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30 NHS Forth Valley for help with participant recruitment, and the University of Stirling for  
31 funding the study.  
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**REFERENCES**

1. Criqui MH, Fronck A, Barrett-Connor E, Klauber MR, Gabriel S, Goodman D. The prevalence of peripheral arterial disease in a defined population. *Circulation*. 1985;71:510-515.
2. Norgren L, Hiatt WR, Dormandy JA, et al, TASC II Working Group. Inter-Society Consensus for the Management of Peripheral Arterial Disease. *Int Angiol*. 2007;26:81-157.
3. Vogel TR, Su LT, Symons RG, Flum DR. Lower extremity angioplasty for claudication: A population-level analysis of 30-day outcomes. *J Vasc Surg*. 2007;45:762-767.
4. McDermott MM, Greenland P, Ferrucci L, et al. Lower extremity performance is associated with daily life physical activity in individuals with and without peripheral arterial disease. *J Am Geriatr Soc*. 2002;50:247-255.
5. Gardner AW, Montgomery PS, Scott KJ, Afaq A, Blevins S. Patterns of ambulatory activity in subjects with and without intermittent claudication. *J Vasc Surg*. 2007;46:1208-1214.
6. Clarke CL, Ryan CG, Granat M, Holdsworth RJ. Surgical intervention does not change walking behaviour in patients with intermittent claudication. *Brit J Surg*. 2012;99(S6):218.
7. Crowther RG, Spinks WL, Leicht AS, Sangla K, Quigley F, Golledge J. Effects of a long-term exercise program on lower limb mobility, physiological responses, walking performance, and physical activity levels in patients with peripheral arterial disease. *J Vasc Surg*. 2008;47:303-309.

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8. McDermott MM, Ades P, Guralnik JM, et al. Treadmill exercise and resistance training in patients with peripheral arterial disease with and without intermittent claudication: a randomized controlled trial. *JAMA*. 2009;301:165-174.
9. Bendermacher BL, Willigendael EM, Tejjink JA, Prins MH. Supervised exercise versus non-supervised exercise therapy for intermittent claudication. *Cochrane Database Syst Rev*. 2006;19:CD005263.
10. van Asselt AD, Nicolai SP, Joore MA, Prins MH, Tejjink JA, Exercise Therapy in Peripheral Arterial Disease Study Group. Cost-effectiveness of exercise therapy in patients with intermittent claudication: supervised exercise therapy versus a 'go home and walk' advice. *Eur J Vasc Endovasc*. 2011;41:97-103.
11. Gardner AW, Montgomery PS, Parker DE. Physical activity is a predictor of all-cause mortality in patients with intermittent claudication. *J Vasc Surg*. 2008;47:117-122.
12. Leventhal H, Breland JY, Mora PA, Leventhal EA. Lay representations of Illness and Treatment: A Framework for Action. In A. Steptoe (Ed.), *Handbook of Behavioral Medicine: Methods and Applications*. 2010:137-155. New York: Springer.
13. Weinman J, Petrie KJ, Sharpe N, Walker S. Causal attributions in patients and spouses following first-time myocardial infarction and subsequent lifestyle changes. *Brit J Health Psych*. 2000;5:263-273.
14. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3:77-101.
15. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *PsycholHealth*. 2010;25:1229-1245.

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16. Yong HH, Borland R, Siapush M. Quitting-related beliefs, intentions, and motivations of older smokers in four countries: findings from the International Tobacco Control Policy Evaluation Survey. *Addict Behav.* 2005;30:777-788.
  17. Mays N, Pope C. Qualitative research in health care: Assessing quality in qualitative research. *BMJ.* 2000;320:50-52.
  18. Long T, Johnson M. Rigour, reliability and validity in qualitative research. *Clin Eff Nurs.* 2000;4:30-37.
  19. Gibson JME, Kenrick M. Pain and powerlessness: the experience of living with peripheral vascular disease. *J Adv Nurs.* 1998;27:737-745.
  20. Wann-Hansson C, Hallberg IR, Klevsgard R, Andersson E. Patients' experiences of living with peripheral arterial disease awaiting intervention: a qualitative study. *Int J Nurs Stud.* 2005;42:851-862.
  21. Crosby FE, Ventura MR, Frainier MA, Wu YWB. Well-being and concerns of patients with peripheral arterial occlusive disease. *J Vasc Nurs.* 1993;11:5-11.
  22. Leavitt MB. Family recovery after vascular surgery. *Heart Lung.* 1990;19:486-490.
  23. Treat-Jacobson D, Halverson SL, Ratchford A, Regensteiner JG, Lindquist R, Hirsch AT. A patient-derived perspective of health-related quality of life with peripheral arterial disease. *J Nurs Scholarship.* 2002;34:55-60.

**Table 1 Demographic characteristics of the participants (n=20)**

<b>DEMOGRAPHICS</b>	<b>Participants</b>
Age, mean (SD)	70.9 (6.6)
Male, n (%)	11 (55)
Retired, n (%)	19 (95)
<b>Education – highest level attended, n (%)</b>	
Secondary schooling	19 (95)
Tertiary education	1 (5)
<b>Living Arrangements, n (%)</b>	
Living alone	12 (60)
<b>Risk factors, n (%)</b>	
Diabetes	5 (25)
Smoker	
Yes	5 (25)
Never	3 (15)
Quit	12 (60)
<b>Comorbidities, n (%)</b>	
Heart Disease	9 (45)
Stroke	3 (15)
<b>Vascular Interventions, n (%)</b>	
Bypass graft	12 (60)
Angioplasty	8 (40)

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**Illness beliefs and walking behavior after revascularisation  
for intermittent claudication – a qualitative study**

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Comment [maw1]: Country

Running title: Intermittent Claudication Beliefs

Key words or phrases: peripheral artery disease, intermittent claudication, physical activity, illness beliefs.

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All authors have read and approved of the manuscript.

## Intermittent Claudication Beliefs

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2  
3 Intermittent claudication (IC) is a common symptom of peripheral artery disease (PAD),  
4 characterized by cramping leg pain when walking, which relieves upon rest. PAD is a  
5 prevalent chronic condition which affects ~10% of adults over 50 years, and ~19% of adults  
6 over 70 years.<sup>1</sup> PAD is usually caused by atherosclerosis, and indicates systemic  
7 atherosclerosis. International guidelines for the treatment of PAD recommend risk factor  
8 management through patient behavior change, in particular smoking cessation, weight loss,  
9 and increased physical activity.<sup>2</sup> However, rates of angioplasty to treat the symptoms of  
10 claudication have dramatically increased in recent years.<sup>3</sup>

Comment [maw1]: Please use JCRP citation format. This paragraph has been corrected to example for the remainder of the paper

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19 Typically, success of vascular intervention for IC is measured by walking capability  
20 in treadmill tests or with self-report quality of life questionnaires. These measures do not give  
21 an understanding of patient actual day-to-day physical activity behavior after  
22 revascularization; however, there is evidence that people with PAD walk significantly less  
23 than other older adults.<sup>4,5</sup> Current treatment, including vascular intervention, supervised  
24 exercise programs, and 'go home and walk' advice, do not change physical activity behavior  
25 of PAD patients.<sup>6-10</sup> As PAD typically involves multiple sites throughout the arteries,  
26 patient behavior change is important alongside vascular intervention to improve health and  
27 reduce the risk of cardiovascular comorbidity and mortality. Physically inactive patients with  
28 IC have twice the mortality risk of moderately physically active (1 to 3 hours per week  
29 moderate physical activity) patients over 5 years, suggesting that even low levels of physical  
30 activity would be beneficial for patients with IC.<sup>11</sup> The Common-Sense Model of self-  
31 regulation of health and illness (CSM) is a popular concept which has been used to  
32 understand modifiable determinants of behavior in a number of chronic diseases.<sup>12,13</sup>

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47 The CSM proposes that when faced with disease symptoms, patient behavior is  
48 influenced by their beliefs about the illness and their beliefs about treatment. The CSM  
49 proposes that these beliefs determine the cognitive and behavioral actions which the  
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3 individual will take to cope with the illness and improve health. The objective of this study  
4  
5 was to explore the beliefs and physical activity behavior of patients with peripheral artery  
6  
7 disease who have received vascular intervention.  
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## 10 **METHODS**

11  
12 Semi-structured interviews were conducted with participants in their own homes. Interview  
13  
14 transcripts were analysed using Thematic Analysis ~~(12)~~.<sup>14</sup> Participants were recruited from  
15  
16 vascular outpatient clinics in ~~2~~ two regional urban hospitals in Scotland. The local NHS  
17  
18 Research Ethics Committee approved this study.  
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**Comment [maw2]:** Were there any basic differences in the 2 hospital, eg, urban vs, rural; inner-city vs suburban, etc?

### 23 **Participants and Procedure**

24  
25 Consecutive patients attending vascular outpatient clinics following angioplasty or bypass  
26  
27 surgery were invited to participate in the study. Inclusion criteria included an original  
28  
29 diagnosis of IC, and revascularization surgery or angioplasty between 6 months and 2 years  
30  
31 previous to recruitment. This time scale was a pragmatic choice to reduce the risk that  
32  
33 participants were still experiencing the short-term effects of surgery (6 months), and so that  
34  
35 participants were captured before discharge from followup (2 years). Potential participants  
36  
37 were excluded from the study if they were unable to speak English, had a psychiatric illness  
38  
39 or were known to be taking part in other studies. Sample size was determined by minimum  
40  
41 sample size (10 participants) and stopping criteria (no new information identified from  
42  
43 preceding 3 interviews) ~~(13)~~.<sup>15</sup> The final sample had 20 participants.  
44

45  
46 Informed consent was taken prior to the interview commencing. Interviews were  
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48 conducted by a researcher trained in qualitative methods and interviewing techniques.  
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50 Interviews were taped and transcribed verbatim and their accuracy checked against the  
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52 original tapes. The interviews followed an interview schedule guided by the study aims to  
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3 explore participant physical activity behavior and beliefs about their illness, with questions  
4 based on the CSM. This model proposes that people form lay illness beliefs which contain  
5 information about the identity of the illness, the temporal features of the illness, the imagined  
6 and real consequences of the illness, the causes of the illness, and beliefs about whether the  
7 illness can be cured or controlled ~~(12)~~.<sup>12</sup> The interview included the open questions: Can you  
8 tell me all about what has happened with your legs? What are your current symptoms? What  
9 do you believe caused the peripheral artery disease (problems in your legs)? What do you  
10 think will happen to your health in the future? How can you control your peripheral artery  
11 disease? How have you changed your health behaviors since the operation? How active are  
12 you on a typical day? Can you describe what kind of walking you usually do? What are the  
13 advantages or disadvantages of doing more physical activity? Participants were also asked to  
14 describe what they believed happened inside their leg to cause the walking pain. Probing  
15 questions were posed as necessary during the interview in response to issues raised by  
16 participants.

### 33 Analysis

34  
35 The interview transcripts were analysed using thematic analysis ~~(12)~~,<sup>14</sup> which is a common  
36 form of qualitative analysis. Our analysis was concerned with the experiences, meaning, and  
37 reality of participants. We took a theoretical approach to thematic analysis, coding the  
38 interview transcripts in relation to the specific aims of the study, ie, focusing on the beliefs  
39 and physical activity behavior of participants.

40  
41 Two researchers, a psychologist and exercise physiologist, conducted independent  
42 initial analysis of the transcripts - familiarization with the data, initial code generation, and  
43 searching for initial themes. The researchers read and re-read the transcripts fully in order to  
44 form a sense of the whole interview (familiarization). The transcripts were then searched

1  
2  
3 systematically for statements related to the study aims (beliefs and physical activity behavior  
4 of participants). Coding was performed manually by marking relevant statements with a  
5 highlighter and assigning a brief descriptive label for each statement in the transcript margins  
6 (initial code). All data sets were coded, and then statements were collated together under each  
7 code in a separate notebook. Initial codes were then sorted into subcategories by grouping  
8 statements with similar meaning, and these were reviewed between the researchers. The  
9 researchers discussed initial coding decisions and subcategory groupings in detail, with the  
10 goal of reaching consensus. There was a high level of agreement between the researchers of  
11 subcategories identified in the analysis. The researchers then worked together to discuss,  
12 agree and refine the final themes, by grouping and integrating inter-related subcategories. The  
13 researchers then re-read the interviews and considered whether the individual final themes  
14 accurately reflected the meaning in the interviews. Each theme represented a pattern of  
15 meaning identified in the set of interviews which related to the aims of the study. The  
16 analysis was therefore deductive in that it focused on the specific aims of the study. A  
17 vascular surgeon independently reviewed the transcripts, checking his agreement with the  
18 coding of the themes.

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37 **RESULTS**

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39 Of the 25 patients invited to participate, 3 declined to take part in the study and 2 participants  
40 failed to attend interviews, therefore 20 interviews were conducted. Participant characteristics  
41 are shown in Table 1.

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44  
45 Five themes were identified in the analysis, which help to explain the physical activity  
46 behavior and illness and physical activity beliefs of patients with IC after they have received  
47 vascular intervention. These themes are described in the following section.  
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**Walking Avoidance**

While most participants were aware that they should be trying to walk, no participants had a clear understanding of how much walking they should be doing, the recommended intensity of walking, or critically, the mechanism by which walking would improve their health.

Despite having received vascular intervention, the majority of participants felt they couldn't exercise because of the pain they experienced when walking, loss of confidence in their walking abilities, the feeling that their legs had lost power, and because they tired very quickly when they tried to walk. As a result of claudication pain, most participants had given up trying to exercise.

Male, 73      *Again it just comes down to the walking, so you can't exercise as much. I mean even going round the shopping centre, you cannae, I mean you've just got to stop and rest.*

Critically, participants did not view walking as a potential treatment for their IC. Participants avoided walking into the claudication pain, worrying that the pain was an indication of damage to the leg. While avoidance is a natural reaction to pain, claudication pain does not cause damage – this highlights the incongruity between participant perception of pain, and the reality of the disease.

Male, 68      *I'm scared of walking in case I damage my legs.*

Participants generally had a limited understanding of the reason why they experienced leg pain when walking. Although some participants understood that they had a narrowing in their circulatory system, they did not understand how this caused pain when walking.

Female, 72      *It's a vein. I've got a lot of wee veins. I've been led to believe the vein's narrowed. I don't know how it's causing the pain.*

Other participants had no understanding of what happened within their leg to cause leg pain.

## Intermittent Claudication Beliefs

1  
2  
3 Female, 66 *The pain starts in the foot and works its way up my legs and into my*  
4  
5 *hips and then my back. I've no idea why.*

6  
7 Female, 70 *Maybe like an oil change in a car, the older you get it's maybe needing*  
8  
9 *renewed ken, like your blood supply, ken? I don't know. I don't know.*

10  
11 When asked about the advantages of doing more physical activity, participants responded in  
12  
13 terms of tasks or activities they would like to be able to do, rather than with disease-specific  
14  
15 benefits. No participants mentioned the potential for symptom reduction, or development of a  
16  
17 collateral blood supply as an advantage of increased physical activity.

18  
19 Male, 73 *Well, I'd like to be able to go to the fishing, things like that. I cannae*  
20  
21 *dae that now. I used tae dae a lot of walking. The legs wouldnae be up*  
22  
23 *to it, nae, nuh, nuh.*

24  
25 Participants adapted to having limited mobility by changing the way they spent their leisure  
26  
27 time, giving up hobbies which involved physical activity and instead finding hobbies where  
28  
29 they didn't need to walk. By reducing their physical activity levels, and slowing their pace,  
30  
31 participants avoided experiencing pain.

32  
33 Male, 81 *I don't really go out. I stay in and watch the telly.*

34  
35 Male, 77 *I never got another dog, because I wasnae fit to take him walks, wi' my*  
36  
37 *legs. I never got another dog. That's the first time I've been without a*  
38  
39 *dog all my life....*

### Treatable Condition

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45 Participants viewed their illness as acute and treatable, rather than a chronic condition which  
46  
47 required self-management. Patients focused solely on the symptom (IC) rather than the  
48  
49 disease (PAD). Despite having received vascular intervention all participants reported having  
50  
51 current symptoms including claudication pain, swelling, tightness, throbbing, numbness,  
52  
53

1  
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3 cramps at night, problems bending the knee and nerve damage, although symptoms varied  
4  
5 greatly in severity. While some of these symptoms are attributable to PAD, others occur as a  
6  
7 result of surgery, and this indicates the participants may have had unrealistic expectations  
8  
9 about vascular intervention, and lack of knowledge about the consequences of surgery.

10  
11 Several participants spoke about the lack of information they were given about their  
12  
13 postoperative health, especially their lack of knowledge about what to do about nerve damage  
14  
15 and swelling after surgery. Participants generally viewed the pain as something which they  
16  
17 hoped could be treated by further surgical intervention or which would disappear magically  
18  
19 with time – critically, they did not feel there was anything they could do to improve their  
20  
21 symptoms or disease.

22  
23 Male, 58 *I wanted the operation thinking obviously this was going to cure it.*

24  
25 Female, 70 *So I'm hoping and praying that (the surgeon) will be able to cure me.*

26  
27 Female, 72 *I'll just take it a day at a time, and see what happens. So I feel, well, if*  
28  
29 *it happens it happens, what can I do, eh? But eh, I just hope it doesn't*  
30  
31 *get any worse. Hopefully it'll go away.*

32  
33 Participants viewed surgeons as the gatekeepers over treatment and control of claudication  
34  
35 symptoms. Participants originally received a diagnosis of PAD from vascular surgeons, and  
36  
37 this appears to have triggered their acute belief system that surgical intervention was the  
38  
39 standard treatment and cure for their symptoms.

#### 40 41 42 43 **Causal Beliefs**

44  
45 Participants cited a wide variety of factors which they felt had caused their PAD. The main  
46  
47 cause mentioned by participants was smoking, 14 of the 17 (82%) participants who were  
48  
49 either current or past smokers, mentioned smoking as a possible cause of their disease.

50  
51 However, several participants mentioned that they were reporting this as a cause because  
52  
53

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3 their doctor had told them that smoking was a cause, but indicated that they did not  
4 necessarily believe this:

5  
6  
7 Female, 65 *It's cos of this (waves cigarette). Well, that's what they said anyway.*

8  
9 Female, 72 *Well, they say the smoking. I mean, I don't know.*

10  
11 Only 1 participant had quit smoking as a result of being diagnosed with PAD. Participants  
12 had no clear conceptual framework which explained how, eg, smoking could cause calf pain.  
13 This was especially the case when there was a time lag between ceasing the causal behavior  
14 and onset of claudication symptoms.  
15

16  
17  
18  
19 Female, 66 *I've given up (smoking) for 5 year. So, it's not the smoking any more  
20 (causing the PAD).*

21  
22  
23 Several participants said that they had no idea what had caused their disease. Of this group,  
24 some were or had been smokers, and some had diabetes – they had risk factors for the disease  
25 but were not aware of this:  
26

27  
28  
29 Female, 70 *I've no idea, that's what I'm saying I just wondered if the metformin  
30 for the diabetes had anything to do with it? I don't know... I don't  
31 know. As I say, I thought maybe the medication had something to do  
32 with it.*

33  
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37 Several participants felt that some form of physical activity had caused their claudication  
38 symptoms. Lack of physical activity is a risk factor for developing IC, however, it is logical  
39 that patients with poor understanding of the circulation system may develop the belief that  
40 physical activity is the cause of their muscle pain.  
41

42  
43  
44  
45 Male, 70 *Right, I had 2 dogs, 3 actually, and I used to take them a walk every  
46 day and every night, I always walked them. So I don't know whether  
47 that could have been it, maybe going out in the damp weather, I used to  
48*

1  
2  
3 *go out in all weather, you know? And I don't know whether that caused*  
4  
5 *it, you know?*  
6

7 Later in the interview, this participant went on to describe how he had given up his dog  
8  
9 because he did not feel able to take it for walks due to the leg pain. The participant model of  
10  
11 his illness was logical and coherent (to him) and clearly led to his choice of behavior-  
12  
13 nonadherence to walking advice, ie, walking had caused his illness, therefore it would be  
14  
15 illogical to walk now.  
16  
17  
18

### 19 **Perceived Consequences**

20  
21 Participants were not concerned about the implications of PAD and atherosclerosis to their  
22  
23 general health. No participants mentioned any concern or awareness about their risk of stroke  
24  
25 or heart trouble. Concerns for future health were instead around whether or not participants  
26  
27 would be offered or would require further vascular intervention for their legs. Participants  
28  
29 saw symptoms and disease as being one and the same thing, they believed they had a disease  
30  
31 in the legs and they had no concept of the broader cardiovascular risks from generalized  
32  
33 atherosclerosis. For those who had not been offered further vascular intervention, there was  
34  
35 concern about what would happen to their mobility in the future.  
36

37 Female, 66 *Well, I'm actually thinking I might end up in a wheelchair, you know?*  
38  
39 *And I would hate for that to happen.*  
40

41 Participants feared that a consequence of claudication would be increasing dependence on  
42  
43 family for help with transport, shopping and housework, due to reduced mobility.  
44

45 Male, 63 *Well, I'm not getting any younger, I'm 63 year old. I hate to think my*  
46  
47 *legs would ever get that bad, and my son, would have to look after me,*  
48  
49 *I don't want that, you know what I mean? Sometimes I think my whole*  
50  
51 *life's went, I cannae walk, I just sit in the house.*  
52  
53

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3 **Surgeon Patient Communication**

4  
5 A number of participants commented that they did not understand the complicated, technical  
6  
7 language used in surgical consultations; that consultations were rushed; and that they were  
8  
9 unable to question surgical staff. These factors contributed to making several participants feel  
10  
11 that they were not clear why decisions had been made.

12  
13 Male, 65 *And when I was in the last time he (surgeon) was talking to a lady*  
14  
15 *doctor and he said I was needing more but he started talking funny*  
16  
17 *words that I didnae understand.*

18  
19 This was especially the case for participants who were suffering claudication pain, but had  
20  
21 had no further procedures offered - they did not understand why.

22  
23 Female, 78 *At that point he said he didn't think there was really too much they*  
24  
25 *could do, where it was or something. He showed me all the x-rays, I*  
26  
27 *tried to look intelligent (laughs). I said "oh well, you know, fair*  
28  
29 *enough.*

30  
31 Surgical consultations were the main source of support and information for participants about  
32  
33 PAD. There did not appear to be any congruence between participant understanding of PAD  
34  
35 and the circulation system, and that of the surgeons. This could mean that although surgeons  
36  
37 give patients information about PAD and treatment options (including physical activity), the  
38  
39 patient cannot process the information in a way which is meaningful to them, reducing the  
40  
41 likelihood that the patient will change their behavior.

42  
43 Female, 72 *he seemed to know that this pain going up here is to do with the blood.*  
44  
45 *But I didnae feel he explained it very well to me on Monday. He seemed*  
46  
47 *to know exactly what I was saying, but there's nothing they can do. He*  
48  
49 *said "There's nothing I can actually do, because it's it's up there", he*  
50  
51



1  
2  
3 *sort of pointed up at my stomach. I felt he didn't really explain it*  
4  
5 *clearly.*  
6  
7  
8

## 9 **DISCUSSION**

10 From this qualitative interview study we found that patients with PAD continue to experience  
11 significant symptoms, including claudication pain, after receiving vascular intervention for  
12 IC. Patients with PAD have dysfunctional beliefs about their illness and about walking. In  
13 particular, patients with PAD viewed their illness as an acute, curable condition, which was  
14 the responsibility of health professionals; they did not appreciate the long-term health  
15 implications of PAD. Although many participants were aware they should be exercising, they  
16 had negative outcome expectations of walking, believing that walking was too painful, may  
17 damage their legs, and they lacked confidence in their ability to walk, therefore they tended  
18 to slow down and avoid exercise.  
19  
20

21 The Common-Sense Model of self-regulation of health and illness (CSM) suggests  
22 that whether or not people change health behaviour when faced with illness is influenced by  
23 their beliefs about the illness and their beliefs about treatment.<sup>12</sup> Coherence between an  
24 individual's illness beliefs and their beliefs about possible treatment is thought to be a key  
25 issue in self-regulation.<sup>12</sup> Weinman et al<sup>16</sup> found that when patients did not have  
26 congruence between their illness and treatment representations, they did not undertake that  
27 treatment.<sup>13</sup> We identified a number of areas of incongruence between patient beliefs about  
28 their illness, and beliefs about treatment, including communication from surgeons, and  
29 recommendations to increase physical activity. Our study suggests that the dysfunctional  
30 beliefs of patients after revascularisation leads to suboptimal coping actions which directly  
31 contravene evidence-based treatment guidelines, including avoiding exercise, reducing  
32 walking and slowing pace.  
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Participant causal beliefs were often incongruent, with some participants seeming to underestimate the role of smoking in the development of PAD. Yong et al<sup>17</sup> found older smokers tend to underestimate the harm of smoking, believe smoking had not damaged their health and believe medical evidence against smoking is exaggerated compared to younger smokers.<sup>16</sup> Only 1 participant in this study had quit smoking as a result of diagnosis with PAD. Smoking cessation interventions for patients with PAD should target these incongruent beliefs about smoking. Validity and reliability was increased by following strategies outlined to increase the rigor of qualitative healthcare research,<sup>18,19,17,18</sup> including having a clearly described process of analysis; peer debriefing through the presentation of methods and findings to relevant health professionals; and having more than one researcher involved in analysis. The sample represented patients who had all been treated for claudication with either angioplasty or surgery. Previous qualitative research into the experience of coping with PAD has not been theory based and has included patients with different levels of severity of PAD, and at different stages of treatment~~[20-24]~~.<sup>19-23</sup>

This study does however have some limitations. Participants were recruited from outpatient clinics, therefore there was a risk that we might miss the chance to recruit patients who had no ongoing leg problems or who had very poor health if they had failed to attend the clinic. However, scrutiny of the 'did not attend' list against the inclusion criteria by the vascular assessment nurse at each relevant clinic determined that all patients who met the inclusion criteria attended clinics on the days when recruitment for the study was taking place. All patients are followed up at clinics for at least 2 years after revascularization. The interview questions specifically explored the physical activity behavior and beliefs of participants. There may be other factors which influence the health behaviour of patients which were not covered by the interview.

1  
2  
3 **CONCLUSIONS**

4  
5 The management of PAD should aim to reduce cardiovascular risk factors in order to achieve  
6  
7 secondary prevention of both leg and other serious cardiovascular complications, in particular  
8  
9 myocardial infarction and stroke, and promote durable outcomes of endovascular/surgical  
10  
11 interventions. Our findings suggest that patients with PAD do not change physical activity  
12  
13 behaviour after diagnosis and treatment for IC, because they have dysfunctional and  
14  
15 incongruent beliefs about PAD, treatment, and health behaviors.

16  
17 Patients currently receive encouragement to change health risk behaviours in  
18  
19 consultations with health professionals, however, the information is not integrated into the  
20  
21 individual's framework of how they view their illness or their understanding of the  
22  
23 circulation system. This may be due, at least in part, to rushed consultations and the technical  
24  
25 language used. Further research is warranted to study how health professionals currently  
26  
27 approach health risk behavior change in patients with PAD, and the barriers and facilitators to  
28  
29 changing health risk behavior in this patient group.  
30

31  
32  
33 **ACKNOWLEDGEMENTS**

34  
35 The authors would like to thank the participants for taking part in the study, clinical staff at  
36  
37 NHS Forth Valley for help with participant recruitment, and the University of Stirling for  
38  
39 funding the study.  
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## REFERENCES

Comment [maw3]: Please use accepted journal abbreviations for all citations

1. Criqui MH, Fronek A, Barrett-Connor E, Klauber MR, Gabriel S, Goodman D. The prevalence of peripheral arterial disease in a defined population. *Circulation*. 1985;71:510-515.
2. Norgren L, Hiatt WR, Dormandy JA, et al, TASC II Working Group. Inter-Society Consensus for the Management of Peripheral Arterial Disease. *International Angiology*. 2007;26:81-157.
3. Vogel TR, Su LT, Symons RG, Flum DR. Lower extremity angioplasty for claudication: A population-level analysis of 30-day outcomes. *Journal of Vascular Surgery*. 2007;45:762-767.
4. McDermott MM, Greenland P, Ferrucci L, et al. Lower extremity performance is associated with daily life physical activity in individuals with and without peripheral arterial disease. *Journal of the American Geriatrics Society*. 2002;50:247-255.
5. Gardner AW, Montgomery PS, Scott KJ, Afaq A, Blevins S. Patterns of ambulatory activity in subjects with and without intermittent claudication. *Journal of Vascular Surgery*. 2007;46:1208-1214.
6. Clarke CL, Ryan CG, Granat M, Holdsworth RJ. Surgical intervention does not change walking behaviour in patients with intermittent claudication. *British Journal of Surgery*. 2012;99 (S6):218.
7. Crowther RG, Spinks WL, Leicht AS, Sangla K, Quigley F, Golledge J. Effects of a long-term exercise program on lower limb mobility, physiological responses, walking performance, and physical activity levels in patients with peripheral arterial disease. *Journal of Vascular Surgery*. 2008;47:303-309.

- 1  
2  
3 8. McDermott MM, Ades P, Guralnik JM, et al. Treadmill exercise and resistance training in  
4 patients with peripheral arterial disease with and without intermittent claudication: a  
5 randomized controlled trial. *JAMA*. 2009;301:165-174.  
6  
7  
8  
9 9. Bendermacher BL, Willigendael EM, Teijink JA, Prins MH. Supervised exercise versus  
10 non-supervised exercise therapy for intermittent claudication. *Cochrane Database-Db*  
11 *Systematic Review*. 2006;19:CD005263.  
12  
13  
14  
15 10. van Asselt AD, Nicolai SP, Joore MA, Prins MH, Teijink JA, Exercise Therapy in  
16 Peripheral Arterial Disease Study Group. Cost-effectiveness of exercise therapy in  
17 patients with intermittent claudication: supervised exercise therapy versus a 'go home  
18 and walk' advice. *European Journal of Vascular and Endovascular Surgery*.  
19 2011;41:97-103.  
20  
21  
22  
23  
24  
25 11. Gardner AW, Montgomery PS, Parker DE. Physical activity is a predictor of all-cause  
26 mortality in patients with intermittent claudication. *Journal of Vascular Surgery*.  
27 2008;47:117-122.  
28  
29  
30  
31 12. Leventhal H, Breland JY, Mora PA, Leventhal EA. Lay representations of illness and  
32 Treatment: A Framework for Action. In A. Steptoe (Ed.), *Handbook of Behavioral*  
33 *Medicine: Methods and Applications*. 2010:137-155. New York: Springer.  
34  
35  
36  
37 13. Weinman J, Petrie KJ, Sharpe N, Walker S. Causal attributions in patients and spouses  
38 following first-time myocardial infarction and subsequent lifestyle changes. *British*  
39 *Journal of Health Psychology*. 2000;5:263-273.  
40  
41  
42  
43 14. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in*  
44 *Psychology*. 2006;3:77-101.  
45  
46  
47 15. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size?  
48 Operationalising data saturation for theory-based interview studies. *Psychology &*  
49 *Health*. 2010;25:1229-1245.  
50  
51  
52  
53  
54  
55  
56  
57  
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3 ~~16. Weinman J, Petrie KJ, Sharpe N, Walker S. Causal attributions in patients and spouses~~  
4 ~~following first time myocardial infarction and subsequent lifestyle changes. *British*~~  
5 ~~*Journal of Health Psychology*. 2000;5:263-273.~~  
6  
7  
8  
9 167. Yong HH, Borland R, Siapush M. Quitting-related beliefs, intentions, and motivations  
10 of older smokers in four countries: findings from the International Tobacco Control  
11 Policy Evaluation Survey. *Addictive Behaviors*. 2005;30:777-788.  
12  
13  
14  
15 178. Mays N, Pope C. Qualitative research in health care: Assessing quality in qualitative  
16 research. *BMJ*. 2000;320:50-52.  
17  
18  
19 189. Long T, Johnson M. Rigour, reliability and validity in qualitative research. *Clinical*  
20 *Effectiveness in Nursing*. 2000;4:30-37.  
21  
22  
23 1920. Gibson JME, Kenrick M. Pain and powerlessness: the experience of living with  
24 peripheral vascular disease. *Journal of Advanced Nursing*. 1998;27:737-745.  
25  
26  
27 204. Wann-Hansson C, Hallberg IR, Klevsgard R, Andersson E. Patients' experiences of  
28 living with peripheral arterial disease awaiting intervention: a qualitative study.  
29 *International Journal of Nursing Studies*. 2005;42:851-862.  
30  
31  
32  
33 212. Crosby FE, Ventura MR, Frainier MA, Wu YWB. Well-being and concerns of patients  
34 with peripheral arterial occlusive disease. *Journal of Vascular Nursing*. 1993;11:5-11.  
35  
36  
37 223. Leavitt MB. Family recovery after vascular surgery. *Heart & Lung*. 1990;19:486-490.  
38  
39 234. Treat-Jacobson D, Halverson SL, Ratchford A, Regensteiner JG, Lindquist R, Hirsch  
40 AT. A patient-derived perspective of health-related quality of life with peripheral  
41 arterial disease. *Journal of Nursing Scholarship*. 2002;34:55-60.  
42  
43  
44  
45  
46  
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**Table 1** Demographic characteristics of the participants (n=20)

<b>DEMOGRAPHICS</b>	<b>Participants</b>
Age, mean (SD)	70.9 (6.6)
Male, n (%)	11 (55)
Retired, n (%)	19 (95)
<b>Education – highest level attended, n (%)</b>	
Secondary schooling	19 (95)
Tertiary education	1 (5)
<b>Living Arrangements, n (%)</b>	
Living alone	12 (60)
<b>Risk factors, n (%)</b>	
Diabetes	5 (25)
Smoker	
Yes	5 (25)
Never	3 (15)
Quit	12 (60)
<b>Comorbidities, n (%)</b>	
Heart Disease	9 (45)
Stroke	3 (15)
<b>Vascular Interventions, n (%)</b>	
Bypass graft	12 (60)
Angioplasty	8 (40)



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**29<sup>th</sup> October 2013**

To Dr Mark A. Williams,

**RE: JCRP-D-13-00074R1, entitled "Illness beliefs and walking behaviour after revascularisation for intermittent claudication - a qualitative study"**

Please find attached the amended manuscript for the above study. I have made the following changes:

1. To Title Page:
  - a. I have added the country (Scotland) to the address of the 5<sup>th</sup> author.
2. To Manuscript:
  - a. I have included a description of where the study took place (two regional urban hospitals in Scotland).
  - b. I have changed the format of the in-text references.
  - c. I have used accepted journal abbreviations in the reference list.

Thank you for accepting this paper for publication in the Journal of Cardiopulmonary Rehabilitation and Prevention.

Yours sincerely,

Maggie Cunningham PhD