

1 **Title**

2 Perceptions of adults with overweight/obesity and chronic musculoskeletal pain: an
3 interpretative phenomenological analysis

4 **Abstract**

5 **Aims:** To gain insight into the lived experience of adults with overweight/obesity and chronic
6 musculoskeletal pain (CMP). Knowledge gained will inform healthcare professionals about
7 the complexity of the weight-pain relationship and enable more effective engagement with
8 this population

9 **Background:** Quantitative studies show links between weight and pain. Adults with
10 overweight/obesity are more likely to experience comorbidity however, qualitative research
11 describing the complexities of the relationship is limited.

12 **Methods:** A purposive sample of adults with overweight/obesity and CMP participated in
13 face-to-face interviews. Interviews were audio-recorded, transcribed verbatim and analysed
14 using IPA.

15 **Results:** Eighteen adults (16 Female) aged 29-71, BMI \geq 25-46 participated in this study.
16 Three superordinate themes emerged: 'pain as a motivator and barrier to weight loss'; 'fear of
17 weight causing more damage'; 'activity is positive'. Pain motivates some individuals to lose
18 weight while simultaneously inhibiting weight-loss efforts. Participants perception that extra
19 pressure caused by their weight further damaged joints contributed to fear and
20 catastrophizing. Fear is often exacerbated by health care professionals' descriptions of
21 musculoskeletal damage, or participants perception of HCPs attitude towards people with
22 overweight/obesity. Conversely, individuals acknowledged the benefits of increased activity.

1 **Conclusion:** Adults with overweight/obesity and CMP in this study identified a bidirectional
2 relationship between their weight and pain, that challenged their weight-loss efforts.
3 Overweight/obesity contributed to fear and catastrophizing, which resulted in avoidance of
4 exercise that would have assisted their weight loss.

5 **Relevance to clinical practice:** Healthcare professionals (HCP) need to understand the
6 complex relationship between weight and pain, and their patients understanding of that
7 relationship. HCP should use therapeutic communication to reduce the fear of weight causing
8 damage, and thus promote physical activities that will contribute to weight loss. It is also
9 important to ensure that the language used with this patient group does not stigmatise
10 individuals, or cause or exacerbate fear of normal movement.

11

What does this paper contribute to the wider global clinical community?

The desire to reduce pain is an important motivator for weight loss, and could be used as a key factor to help patients engage in weight loss.

Fear of causing further damage or increased pain, due to their weight, causes some patients to avoid exercise.

Integrated management of overweight/obesity and chronic musculoskeletal pain will improve outcomes for both conditions.

16 **Key Words**

17 Obesity, chronic pain, management, interpretative research , qualitative approaches

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1 **Introduction**

2 Obesity is a growing public health problem, that is currently estimated to affect 600 million
3 adults worldwide (World Health Organisation (WHO, 2014). WHO define obesity as
4 “*abnormal or excessive fat accumulation that may impair health*”. Obesity is categorised
5 using Body Mass Index (BMI) defined as weight/height^2 (kg/m^2). A $\text{BMI} \geq 25$ is classed as
6 overweight, whilst obesity is classified by a $\text{BMI} \geq 30$. Similarly chronic pain affects 1 in 5
7 adults globally (International Association for the Study of Pain (IASP) 2015). Quantitative
8 research has shown that adults with overweight/obesity are more likely to experience chronic
9 pain than those of normal weight (Stone & Broderick 2012). However, no definitive cause
10 and effect has been established, and the complexity of the relationship from the perspective
11 of individuals with co-morbidity is not well understood (Ray, Lipton, Zimmerman, Katz, &
12 Derby, 2010). Knowledge of how adults with overweight/obesity and chronic
13 musculoskeletal pain (CMP) perceive the relationship between their weight and pain may be
14 useful for healthcare professionals (HCPs). Such information may enable effective
15 engagement with this patient group, and underpin appropriate management of this
16 comorbidity. This paper presents the findings of a qualitative study which aimed to gain
17 insight into the lived experiences of adults with overweight/obesity and CMP.

18

19 **Background**

20 Globally the occurrence of overweight/obesity has risen markedly since the 1990's, with rates
21 more than doubling in developed countries (WHO 2014). Currently more than 60% of UK
22 adults have a $\text{BMI} \geq 25$. This is one of the highest levels of overweight/obesity in Europe, and
23 the trend is predicted to continue (Craig, Fuller & Mindell 2015; Cancer Research UK). CMP
24 currently affects one in five adults in developed countries (International Association for the
25 Study of Pain (IASP) 2015). These two conditions frequently co-exist in a complex

1 association that compounds the effects of each individual condition (Blagojevic, Jinks,
2 Jeffrey & Jordan, 2010; Shiri, Karppinen, Leino-Arjas, Solovieva, & Viikari-Juntura, 2010).
3 However, the nature of the link between overweight/obesity and pain is poorly understood.
4 Several studies suggest the link extends beyond the obvious mechanical-structural
5 relationship, and involves metabolic factors that lead to systemic inflammation, and/or
6 increased pain sensitivity (Janke, Collins & Kozak, 2007; Bonakdar, 2013; McVinnie, 2013).
7 The presence of co-morbidity may result in physical limitations that affect daily
8 functioning, and reduce independence or ability to work (Wachholtz, Binks, Eisenson,
9 Kolotkin, & Suzuki, 2010). Deterioration in mental health is also common. A combination of
10 reduced physical function and poor mental health, may result in social isolation and
11 decreased quality-of-life. The interplay between biological, psychological and social factors
12 is often referred to as the biopsychosocial effect (Gatineau, Hancock & Dent, 2013).
13 Bonakdar (2013) and McVinnie (2013) assert that treatment of adults with
14 overweight/obesity and CMP should address both conditions in order to be effective, an
15 approach that can be challenging. Patients report that HCPs are often reluctant to discuss
16 weight issues, or tend to focus on the management of their pain in isolation (Jackson et al
17 2013; Janke, Ramirez, Haltzman, Fritz, & Kozak, 2016). Current National Institute for
18 Health and Care Excellence (NICE, 2014a) guidelines for weight management recommend
19 providing lifestyle weight management programmes that include exercise to adults with
20 overweight/obesity in the UK. Whilst guidelines (NICE 2014b) for the treatment of some
21 chronic pain conditions such as osteoarthritis advise that treatment programmes encourage
22 self-management, weight reduction and exercise. However, CMP can be a barrier to exercise
23 in an overweight/obese population (Wachholtz et al., 2010). Excess weight has been shown to
24 restrict physical activity (de Rooij et al., 2013), whilst low mood, resulting from co-
25 morbidity, reduces self-efficacy in this population. This may lead to individuals with

1 overweight/obesity employing less effective strategies, such as emotional eating to help them
2 cope with pain (Janke & Kozak, 2012).

3 Research examining the relationship between overweight/obesity and CMP is predominantly
4 quantitative in nature. Only a relatively small number of qualitative studies have explored
5 individuals' experience of co-morbid weight and pain (Janke & Kozak, 2012; Rutledge,
6 Cantero, & Ruiz, 2012; Morden, Jinks & Ong, 2014; Janke et al. 2016). Furthermore, only
7 one in-depth qualitative study has explored co-morbidity from the perspective of adults
8 actively engaged in weight loss (Janke & Kozak, 2012). However, the study was conducted in
9 the USA with male participants thus the findings may not translate to a UK context, where
10 women predominate in the uptake of weight-management services (Stubbs, Morris, Pallister,
11 Horgan, & Lavin, 2015). In-depth qualitative research is therefore important to further
12 understand how adults actively seeking weight management perceive the relationship
13 between their weight and pain. Further understanding of the link between weight and pain
14 from the individuals' perspective may help clinicians to appreciate the meaning of this co-
15 morbidity, and identify new ways to optimise management for these patients.

16 The aim of this study was to gain insight into the lived experience of adults with
17 overweight/obesity and chronic musculoskeletal pain (CMP).

18

19 **Methods**

20 **Theoretical perspective and Study Design**

21 The theoretical perspective framing this study is the Transtheoretical Model (TTM)
22 developed by Prochaska and DiClemente (1983). This integrative, biopsychosocial model,
23 also known as the Stages of Change model, proposes six stages used to conceptualise the

1 process of intentional behaviour change. TTM was a useful framework for this study as the
2 participants currently attending a weight management service were likely to be in the action
3 stage, this is where individuals have made lifestyle modifications in order to achieve the
4 desired goal (in this case weight loss). It is important to understand the stage of change an
5 individual has reached, as this may be indicative of their level of self-efficacy (i.e. their level
6 of confidence in maintaining the behaviour change). TTM was employed in the development
7 of the topic guide for the semi-structured interviews.

8 The qualitative design adopted within this study was interpretive phenomenological analysis
9 (IPA). First used in social psychology, IPA has subsequently become an established health
10 research method, and is seen as appropriate for the analysis of sensitive topic areas (Smith,
11 Flowers, & Larkin, 2009). Thus IPA was selected for this study, as the method fits with the
12 aim of increasing knowledge and understanding of the perceptions and lived experiences of
13 adults with CMP and overweight or obesity, who are attempting to lose weight IPA is
14 described as a double hermeneutic, that allows researchers to set individual experiences in
15 context. This is undertaken through the analysis of first person accounts of their relationship
16 with the phenomenon under investigation, whilst acknowledging the central role of the
17 analyst in the research process. The analysis leads to increased understanding of the
18 phenomenon from the participant's perspective (Pringle, Drummond, McLafferty, & Hendry,
19 2011). Combining the TTM framework with IPA methodology facilitated a rich description
20 of participants views, and exploration of participants decision-making processes.

21 **Data collection**

22 **Ethical approval and permission**

23

1 Ethical approval to conduct the study was obtained from Teesside University School of
2 Health and Social Care Research Governance and Ethics Committee. All participants
3 provided written informed consent. Permission to access members in the locality was granted
4 by a commercial weight loss organisation.

5 **Participants**

6 Participants were recruited from regional branches of a commercial weight loss service.
7 During a short presentation the researcher (first author) introduced herself and explained the
8 purpose of the study. Group members were invited to ask questions, given the opportunity to
9 speak to the researcher privately, and offered comprehensive written information about the
10 study. Individuals were eligible if they were: currently attending the commercial weight loss
11 service; aged ≥ 18 years, BMI ≥ 25 ; self-reported persistent musculoskeletal pain $\geq 4/10$ (0 =
12 no pain, 10 = worst pain) any site for >3 months and occurring most days. Within the
13 confines of the inclusion criteria, purposive sampling was employed to ensure that participants
14 of varying age, gender, BMI, pain location and/or severity, and stage in the weight-
15 management journey were recruited. Pregnant or breastfeeding women, and those who did
16 not speak English were excluded.

17 **Data collection tools**

18 Face-to-face in-depth, semi-structured interviews were conducted in a private place by the
19 first author who is a female PhD student, and experienced registered nurse with training and
20 experience in qualitative research. Interviews varied in length, typically lasting 25 minutes.
21 One participant's wife was present during the interview. She was also attending the weight
22 loss group, and occasionally reinforced points made by the participant during the interview.
23 Prior to each interview self-administered questionnaires were used to gather the following
24 information: sex; age; weight and height; Brief Pain Inventory (BPI) (Cleeland, 1991) to

1 measure intensity, location and effects of pain; the Hospital Anxiety and Depression Scale
2 (HADS) (Snaith & Zigmond, 1994) to measure anxiety and depression. Demographic data
3 and information obtained from the BPI and HADS are presented in Tables 1 and 2.

4 A topic guide underpinned by the aims of the study, and the TTM was used to focus data
5 collection on participants' experiences of co-existing weight and pain. (See Figure 1)

6 Interviews were digitally audio-recorded to allow the researcher to maintain eye contact, and
7 probe where necessary following participants response to initial questions. Field notes were
8 made immediately following each interview to record contextual information, and contribute
9 to reflexivity.

10 Insert Figure 1

11 **Data analysis**

12 IPA was employed in this study to analyse data. The process of analysis followed that
13 described by Smith et al. (2009). Each individual interview was transcribed verbatim by the
14 first author and checked to ensure accuracy of transcription. Transcripts were re-read several
15 times while simultaneously listening to participants voices and making notes on tone of voice
16 and pauses. Repeated listening to participants voices allowed the researcher to become
17 immersed in the data and facilitated a rigorous, idiographic process. In accordance with IPA,
18 each case was scrutinised individually, and exploratory notes on the text were made in one
19 margin. These notes were coded in a second margin as emergent themes, which were then
20 integrated to form connections and superordinate themes. NVivo software was used to
21 manage the data. This process was repeated for each case to ensure each interview was
22 analysed on its own merit, and allowed personal experience and insight to emerge. Following
23 analysis of individual interviews, themes were examined across all cases to identify patterns,
24 and connections that reflected shared understandings, as well as setting individual

1 experiences in context. Superordinate themes were documented in a master table that
2 underpinned the narrative account.

3 To ensure credibility of the findings, member checks were carried out. Participants were
4 telephoned to discuss individual analysis. Additionally, the second author read each
5 transcript and made separate notes on emerging themes, before reading and discussing the
6 superordinate themes developed in the primary analysis. The research team met regularly to
7 discuss original transcripts and emerging themes. It is acknowledged in IPA that the analyst
8 is an integral part of the research process, and therefore the researchers' interpretation of the
9 data will differ. However, discussing and explaining emergent themes provided the
10 opportunity to develop the robustness of findings (Cutcliffe & McKenna, 1999; Houghton,
11 Casey, Shaw & Murphy 2013).

12 **Results**

13 18 adults (16 women) took part in the study. Age ranged from 29-71 years, and all categories
14 of BMI ≥ 25 were represented in the sample. Participants reported pain in various sites, but
15 particularly in their knees and lower back, with several reporting pain in multiple sites. The
16 mean pain score was 4.6 (out of 10) for intensity, and most of the participants reported that
17 pain affected their enjoyment of life and ability to sleep. Several felt it affected their
18 relationships with others. It was noted that participants with the highest BMI tended to report
19 greater average pain scores. (Demographic data can be found in Tables I and II)

20 Three of the major, interconnected superordinate themes derived from the IPA are presented
21 here. Verbatim extracts from participants are used to support the analytic narrative.
22 Pseudonyms have been used to protect anonymity.

23 **Superordinate theme 1: Pain: motivator and barrier to weight loss**

1 This theme identified how pain motivated participants to lose weight, while at the same time
2 acting as a barrier to weight loss. Two thirds (12/18) of participants in this study cited pain as
3 an important factor in their decision to lose weight. The data therefore strongly identified
4 pain as a primary motivator for weight loss in this group. Many of the participants hoped that
5 by losing weight they would reduce their amount of pain, and somehow break the weight-
6 pain cycle. Liz explains the weight-pain cycle:

7 *it is a vicious circle of..... y'know tryin' to lose weight, tryin' to..... y'know not be in*
8 *pain, tryin' to exercise and then be in pain.....y'know.*

9 Joyce believed that she needed to lose weight in order to reduce her pain. She perceived a
10 lack of support from HCPs, and felt alone in her efforts:

11 *Just the pain, the pain is like the thing that's saying you know you have to get this*
12 *weight off or you're just gonna be in pain all the time and I don't go back to the*
13 *doctors 'cos they'll just tell me the same thing.... So there's only one person who can*
14 *do it and it's me... yeah*

15 Participants' understanding of the pain-weight relationship was based mainly on how they
16 viewed the effect of their weight on pain, rather than vice versa. The main concern was that
17 weight put excess pressure on joints causing damage that resulted in pain. Following
18 diagnosis with osteoarthritis, Karen decided to lose weight to prevent further deterioration,
19 thus here pain acted as a motivator to weight-loss:

20 *if I'd carried on gaining weight the way I was, I was just going to exacerbate the*
21 *problem by puttin' that pressure on ma joints. I think by losing the weight then I can*
22 *slow the process down*

1 Some noted how they felt their pain had begun to reduce as they lost weight, and this in turn
2 acted as a motivator to weight loss. In this extract Paul explains that it was not until he had
3 lost weight that he became aware that increased weight had negatively affected his pain:

4 *I mean, me weight that I had was probably increasing me pain, so reducing me weight*
5 *is reducing me pain and it has done, it has done, we're sure of that..... I mean I go*
6 *outside with Jill and we do a bit on the garden, whereas before I used to sit and watch*
7 *her*

8 The implication was that even if pain was not the initial factor motivating weight loss, there
9 may be a time when a person realises that as their weight decreases they are experiencing less
10 pain. This illustrates that, throughout the weight loss journey, the theme of pain motivating
11 weight loss was relevant. In the extract above Paul goes further, and in accordance with
12 others in this study, discusses how the end result is increased ability to engage in activity with
13 reduced pain, thus weight loss was facilitating the transition back to activity.

14 While most of the participants in the present study clearly perceived a strong relationship
15 between CMP, weight and activity, three participants were less sure of a pain/weight
16 relationship. Bob clearly stated the belief that no such relationship existed, and his experience
17 is equally important to note. Bob initially considered that his extra weight might be
18 contributing to his foot pain however he said "*I've lost two, three stone and I... the pain's*
19 *getting steadily worse*" [One stone = 14 pounds]

20 In addition to motivating participants, pain also acted as a barrier to weight loss by limiting
21 the type and amount of activity that the participants in this study were able to do. Grace
22 wanted to be as active as possible to aid weight loss, but at times was less able to exercise due
23 to her pain:

1 *If, if, if ma knees are not bad I do try an' walk several times a week. Which I'm not at*
2 *the moment, because em when they are hurting this much y'know*

3 There were clear examples of participants for whom pain was an important motivator for
4 weight loss, and at the same time a barrier. In the earlier extract Joyce was adamant that she
5 needed to lose weight in order to relieve her pain, here she explains how pain stopped her
6 from achieving weight loss:

7 *I'm not losing as much, like I'd want to and that's because of the immobilityI*
8 *can't like do any exercises, I can't go out and walk... y'know. If I do it's really*
9 *painful”*

10 In some cases pain affected eating behaviour, and resulted in behavioural changes that
11 promoted weight gain. Karen was a keen cook, however, when pain affected her sleep she felt
12 “*exhausted all the time*”. Pain and tiredness affected her ability to stand up for long periods
13 of time,

14 *“I just didn't have the energy, I found standing up at the stove the pain in my hips in*
15 *particular and ma knees was really hard, making it really hard to stand and cook...we*
16 *just ate rubbish”*

17 Finding it difficult to aid weight-loss by exercising was very demotivating, and some
18 participants used language that suggested weight loss was a battle that they were losing.
19 Emily said she “*struggled with ma weight over the years*”, while Ellie viewed dieting as “*a*
20 *constant battle*”. Individuals need to feel supported in their battle or they risk giving up
21 altogether. Participants also felt blamed for their lack of success in the weight-loss
22 programmes, Pam perceived a lack of understanding and support from the weight-loss
23 consultant, in the role pain played in reducing mobility:

1 *I'm losing weight and gaining weight and losing... I'm staying the same weight*
2 *basically...she gave me the impression it was like my fault, you know that I just wasn't*
3 *trying and I'm thinking well I am really but I am a little bit hampered by how little*
4 *I'm starting to be able to walk, how much pain I was in*

5 Some weight loss services recognise and reward members who increase their activity levels.
6 This extract shows frustration at the lack of acknowledgement for those who were less able to
7 participate at the prescribed level, whilst still striving for a personally achievable goal:

8 *it [pain] stops me exercising which I think would be em advantageous certainly to*
9 *weight loss. I mean the, at, at [name of company] they have em [name of award*
10 *programme], you know and you can, you can like do your [...] and if you just say right*
11 *I'm going to do this kind of exercise and I'm going to increase it a little bit and you*
12 *get your [award] and I think "d'you know, I'd really love to be able to do that" but*
13 *there's actually nothing in that book that is suitable for somebody that can't actually*
14 *do ordinary exercise, which is quite amazing to me because you can click on the*
15 *website and you can put down you've got arthritis, you've got high cholesterol, if*
16 *you've got high blood pressure and it'll sort a diet out and give you recommendations*
17 *for what to eat, when it comes to the exercise they don't seem to have that capacity to*
18 *like, to aid people, and I'm not the only person that's got arthritis and can't exercise*
19 *that goes to a slimming class, you know em there doesn't seem to be anything that*
20 *says you can have this award if you just manage to walk 20 steps up the street*
21 *unaided, which they don't understand is a huge thing for somebody like me (Pam)*

22 It can be seen in these extracts that Pam strongly believed her pain was an important barrier
23 to her achieving rewards related to weight-loss efforts. Furthermore, she perceived those
24 who she looked to for help, lacked understanding of the extent to which pain inhibited

1 physical activity. This seemed to have a demotivating effect on her efforts, thus becoming a
2 barrier to weight-loss.

3 **Superordinate theme 2: Fear of weight causing more damage**

4 Throughout the interviews participants showed concern about the impact that being
5 overweight/obese had on their joints. They were anxious that their weight was causing
6 damage to joints that resulted in bones rubbing together or trapping nerves. Their language
7 alluded to “*pressure*” and “*strain*” that was interpreted to result in “*wear and tear*” of their
8 joints and there was evidence of unclear comprehension of anatomy and physiology. Alice
9 was worried that her joints were “*rubbing together... distorting movement*”. These concerns,
10 combined with beliefs about pain, and the causes of pain onset, led to anxiety in several of
11 the participants, and even catastrophizing in some. Although she had not had any confirming
12 investigations Abby said “*they reckon I’ve got a nerve trapped in ma hip*”. Abby found it
13 difficult to sleep due to her pain, compounded by her lying awake worrying, due to the
14 anxiety related to the cause of pain. The image of a nerve trapped in her hip was a source of
15 anxiety, as she believed she could do little to relieve it. However, following weight loss in
16 excess of 14kg, Abby explained her understanding of how her weight affected her joints:

17 *by a process of elimination I’ve worked out that I think the weight does have a lot to*
18 *do with it, because em, obviously I eh I must have a nerve trapped or something but,*
19 *an’ then I think is it trapped because there is pressure on me hips an’ everything to*
20 *like move me weight around. ‘Cos like I said me knee has-, burns sometimes but it*
21 *has, em it doesn’t burn as much since I’ve been losing the weight (Abby)*

22 Her attribution that weight loss had already reduced the burning pain in her knee motivated
23 her to continue losing weight.

1 Other participants, who also worried that nerves were trapped in various locations,
2 demonstrated how this provoked anxiety, and fear of movement causing damage. This
3 resulted in participants being very cautious in movement. For Grace, fear of movement may
4 have been the result of her beliefs about the cause of her back injury that led to the end of her
5 career:

6 *when I bent down I twisted slightly so with the weakness there [in her back] I think*
7 *that, I think that sharp pain was from trapping a nerve*

8 The perception of damage, that their weight was inflicting on their joints, was described by
9 many of the participants. Descriptions made it clear how fear resulted in them being less
10 inclined to exercise, or even participate fully in everyday physical activity. Pam reported
11 pain in several weight bearing and non-weight bearing joints, and was very limited in what
12 she did. In this extract, she described her perception of the effect of her weight on her knees
13 when she is coming down stairs: there is a distinct sense of her fear of causing more damage:

14 *I think it just puts all that upper body weight onto like one little joint, which on one*
15 *knee is virtually non-existent and on the other one is attached to me bone, you know*
16 *so.... I'm sure it's making it much worse. I'm sure it's em wearing it away. I think it*
17 *is, I really do*

18 Similar to others in this study, Pam was very concerned about the condition of her joints,
19 viewing them as weak and vulnerable. Earlier in the interview she had spoken about the
20 causes of damage in her knees, using her interpretation of what the doctor had told her:

21 *wear and tear, swelling, moving it, the left one's... she, the doctor said to me "it's*
22 *pretty shot" it's, it's like in bits really, but the right ones actually attached itself to the*
23 *top of my eh one of my bones, she didn't say which one, but one of my leg bones*

1 In keeping with Pams experience, other participants' accounts of the information they had
2 been given by HCPs indicated that some of their anxiety could be attributed to inadequate or
3 inaccurate explanations about their pain. Careless use of language by HCPs may be
4 misinterpreted or increase fear. Paul had been advised "*I've got a collapsing spine*", while
5 Emily was not surprised when she developed arthritis in her knees, as she had already been
6 warned that this was likely to occur:

7 *it must be about ten year ago, something like that. An' I always remember the girls*
8 *sayin', the nurse sayin' - when I went for ma physio [for back pain] that the next thing*
9 *to go would probably be ma knees*

10 Although pain did not stop her from exercising, Leaha was worried and fearful for her health
11 generally, and had found the MRI scan investigating her back pain a very unpleasant
12 experience. Perhaps the information she was given during the consultation with her GP
13 contributed in some way to her worry:

14 *it's a new doctor that's em come in an' he said "oh we'll send you for an MRI to see*
15 *whether or not there's any, em your discs are crumbling or it, its just a trapped nerve*

16 Anxiety related to fear of their weight causing further damage may explain why some of the
17 participants in this study did not exercise, despite them acknowledging that exercise was
18 beneficial for overall health, as well as supporting dietary weight loss efforts. Joyce seemed
19 very anxious about her inability to walk, even though she had been advised that walking was
20 a good exercise for arthritis. When asked what worried her, she replied that walking made
21 the pain "*really bad*", and went on to describe the condition of her knee joints:

22 *now I just feel as though it's like bone on bone and they won't do anything about it*
23 *unless I lose weight (laughs) so I'm in a little.....*

1 This extract provides insight into why some participants in this study, who envisaged that
2 their weight was causing so much pressure, were reluctant to exercise until they had lost
3 some weight. This is expanded in the third and final theme.

4 **Superordinate theme 3: Activity, at least certain types of activity, is positive**

5

6 The focus of this theme is participants' understanding of the positive effects of being active,
7 particularly in relation to formal exercise. Participants who reported a return to exercise in
8 this study, tended to be those who had lost a significant amount of weight and/or whose BMI
9 put them in the overweight rather than the obese category. These participants more often
10 reported lower average pain scores than participants who had lost less weight.

11 The benefits of exercise were recognised particularly by those who had increased their
12 amount of exercise, and also by those who expressed the intention to return to, or increase
13 exercise in the future. Penny had started exercising following substantial weight loss, in this
14 extract she discussed improved general health and fitness, and acknowledged that exercise
15 was positive:

16 *I'm tryin' to do more exercise as well 'cos I know that's better for your heart 'n just*
17 *generally y'know, so. And, and things are, are okay with my exercise. I feel like I'm*
18 *doin' more an' it's all like really positive stuff*

19 Although she currently found it difficult to find time to exercise, in the past Penny had had an
20 individual programme devised by a fitness instructor at the gym, to help her with back pain.
21 Her trust in the fitness instructor was important, and she explained the benefit of exercise
22 extending beyond increased physical capability by prompting healthy behaviour in other
23 areas:

1 *You know ma whole- ma joints were feeling better, the whole- me- an' then because*
2 *you're feeling better... eh wi- with your exercising, it's sort of a positive thing an' then*
3 *you try with your food, don't ye, an' you know you're turning your negatives into*
4 *positives aren't you an' y'know it's good, it's good (Penny)*

5 Although a minority view, Leaha went even further by identifying how exercise actually
6 helped her to manage the pain in her back:

7 *if I don't go to the gym for three days it's like you can tell it's siezin' up, y'know I*
8 *need to get in there to start like stretchin' it off and movin' it especially like em the*
9 *cross-trainer to get like the hips goin'. Em an' sit-ups an' just like generally movin'*
10 *about in exercise it's loads better yeah*

11 Several participants demonstrated awareness of the psychological benefits of exercise, with
12 Cathy describing herself as “*buzzing*” at the end of an exercise class. Hazel, who was at an
13 early stage in her weight loss journey had embarked on a paced return to exercise, expressed
14 being motivated to try harder:

15 *and when you do well, 'cos we're recording the walking so we know how long and*
16 *the, the distance, it makes you think “Oh, actually I can maybe do half a mile more by*
17 *the end of this week” and I think that helps, gives you something to aim for (Hazel)*

18 Despite her current lack of exercise due to anxiety about the effect of her weight on pain,
19 Cathy was aware that when she had been more active in the past, she had experienced less
20 pain, and had been able to do more. She recalled how, at the end of a day out, her husband
21 had commented on how far she had walked:

22 *he said “You've walked all the ways to so and so, you've been running”. He said “don't*
23 *you realise”. I'm like “I, no” and this was like.. like em last year when I was working you*

1 *see so that walking in the [workplace] had helped, right, whereas..cos I've been out of*
2 *work from November and its been cold and I've got snuggled in the house I haven't*
3 *bothered you see*

4 However, Cathy and other participants in this study wanted to exercise in a manner that they
5 considered to be 'safe'. Swimming or water based exercise and cycling were the forms of
6 exercise most likely to be deemed as *safe*, with participants citing the effect of water
7 supporting their weight as being helpful. Abby stressed that swimming was the only exercise
8 she was able to do. In this extract she explained how swimming was helpful in relieving the
9 pressure in her hip that caused her severe pain:

10 *I can sw, swimming seems good because it takes the weight off it, so that's good*

11 Participants whose BMI was within obesity class II or III were more concerned with *safe*
12 activity than those with lower BMI. This theme linked with the theme 'fear of weight causing
13 more damage', where the factors that promoted this fear were examined. Sarah wanted to
14 exercise but was worried about her knee and wanted to protect it,

15 *I don't want anything I do at this stage to make it worse which is why I do quite a bit*
16 *of walking in the swimming pool because then at least the bouyancy helps you along*

17 The concept of supporting weight while exercising seemed particularly important to those
18 participants who had not yet returned to exercise, but intended to do so. Here Karen
19 discusses her intent to resume regular swimming:

20 *we're going to re-join the swimming baths I'm going to go again, where we go every*
21 *morning because I quite like swimming, swimming doesn't seem to put the pressure on*
22 *my joints 'an I can go at me own pace*

1 Ellie found some forms of exercise resulted in pain and swelling of her joints, and considered
2 cycling as a safe form of exercise:

3 *I was quite up f'for gettin' a bike 'cos I thought "well that'll ease the pressure on ma*
4 *knees an' ma ankles if I can cycle*

5 However, when she went to buy a bike, concern that she was too heavy for the tyres resulted
6 in her leaving the shop without buying or even approaching a sales assistant, who may have
7 been able to help. Her embarrassment about her size was evident in the way she paused and
8 laughed when she said *"there wasn't a tyre that could... take ma weight ((laughing)) on any*
9 *of the bikes so...."*

10 Participants in this study who had not yet started to exercise demonstrated a vicious cycle i.e.
11 that they needed to lose weight in order to exercise, which would then help them to lose
12 weight. It was important for individuals to be able to exercise in a manner with which they
13 felt confident, in order to ensure sustained effort. However, it may be that as swimming and
14 cycling require more organisation than simply going for a walk, participants who were not
15 exercising, were allowing themselves to contemplate safe activity, which justified them
16 remaining inactive.

17 **Discussion**

18 This study investigated experiences and perceptions of adults with overweight/obesity living
19 with CMP. Three superordinate themes were presented; most participants were aware of a
20 weight-pain relationship that motivated them to lose weight. However, pain was also reported
21 to be a barrier to weight loss efforts. Data suggested a bi-directional relationship between
22 pain and weight wherein the impact of weight on pain restricted movement, which in turn
23 inhibited weight loss. This was described as a vicious cycle that was difficult to break.

1 Descriptions of how pain and/or weight affected physical, psychological and social aspects of
2 life, provided insight into the decision-making process that led individuals into the action
3 phase of the TTM. Fear of weight causing further damage or increased pain, resulted in
4 participants being anxious or cautious in their movement. Despite fear, participants
5 demonstrated awareness of the positive impact of exercise. While for some a cycle of:
6 needing to lose weight, in order to exercise to lose weight existed, others elucidated how
7 weight loss motivated and enabled them to engage with exercise.

8 Most participants in this study experienced cyclical weight lose and regain , this is not
9 unusual. Fildes et al. (2015) refer to this as ‘weight cycling’. Our finding is consistent with
10 their quantitative research examining weight loss and long-term maintenance of healthy
11 weight. Our study enriches these findings by illustrating participants perception of a vicious
12 cycle relationship between weight and pain in which co-morbidity heightened the challenge
13 of losing weight, and sustaining weight loss effort.

14 Participants’ insights, gained through previous weight-loss attempts, increased awareness that
15 when they weighed less they experienced less pain. This is in keeping with Janke & Kozac
16 (2012), Janke et al. (2016) and Morden et al. (2014) who previously described how
17 participants are conscious that pain and weight are linked. An important additional finding of
18 our study, is that pain was a primary motivator to lose weight in two thirds of those attending
19 the weight-loss programme. However, having overweight/obesity increased pain. BPI scores
20 supported the narrative of those with higher BMI who reported high levels of pain. In this
21 group CMP caused lowered levels of activity, thus creating a barrier to weight loss that
22 resulted in a cyclic pattern that was difficult to break. In relation to the TTM model, pain was
23 the factor that pushed participants into the action phase (motivating them to lose weight).
24 Conversely the combination of pain and weight decreased their perception of self-efficacy
25 and thus impeded weight-loss efforts. This pattern illustrates the cyclical nature of the TTM

1 model, where individuals may regress to earlier stages depending on circumstances. The
2 TTM model proposes that high levels of self-efficacy are required to enable individuals to
3 sustain the action phase (Prochaska & DiClemente, 1983). Therefore, in agreement with
4 Bonakdar (2013) and McVinnie (2013) it may be important that individuals with co-morbid
5 pain and weight are appropriately supported to help them achieve their desired goal.

6 Several factors affected participants' efforts to engage with exercise that would enhance
7 weight loss. These involved complex processes linked to participants' beliefs and
8 understanding of the effects of their weight on pain. Most of the participants discussed the
9 importance of exercise and gave examples of ways in which they had experienced benefit,
10 such as feeling healthier, more positive, and motivated to adopt other healthy choices such as
11 eating well. This alludes to participants breaking the cycle, however only those who had lost
12 a significant amount of weight, or who had a BMI in the overweight (rather than obese)
13 category, reported that they had increased the amount of exercise they were doing. Those
14 with higher BMI were cautious, and so while they expressed intention to increase activity,
15 they tended to restrict the amount or type of exercise they engaged in. Vincent, Drummond,
16 McLafferty, & Hendry's (2011) assert that a BMI of 35 is the threshold at which there is a
17 significant rise in functional impairment, which supports this finding. In addition to being
18 vigilant about how they moved generally, participants with a higher BMI reported feeling
19 more comfortable with cycling or swimming, forms of exercise they considered safe. The
20 reason given was that they were afraid that higher impact exercise would cause more pain, or
21 damage to joints. Our finding is consistent with Vlaeyen & Linton's (2012) fear-avoidance
22 model, that proposes pain-related fear leads to reduced movement, and in the long-term
23 contributes to disability. Perceptions of how weight impacted on their pain appeared to be
24 fuelling catastrophizing in this group. Our findings suggest that in populations with
25 overweight/obesity, pain-related fear of movement may be proportionally related to weight.

1 At times participants' understanding of HCPs description of their condition, or the treatment
2 required, appeared to reinforce fear regarding the fragility of joints or nerves. This finding is
3 consistent with a review that found fear avoidance beliefs were high in many HCPs. The
4 HCPs attitudes and beliefs affected their management of patients with low back pain, and
5 were associated with increased fear avoidance beliefs in their patients (Darlow et al., 2012).
6 Our findings reinforce the need for HCPs to be aware of the language they use, and to ensure
7 that explanations given to patients are clear and accurate. Additionally, fear may in some part
8 be due to HCPs failing to acknowledge any relationship between pain and weight, other than
9 that excess weight causes pain. Some participants were reluctant to consult HCPs for help
10 managing pain, as they perceived their weight would be blamed for the occurrence of pain.
11 This finding is in keeping with previous studies reporting adults with overweight/obesity
12 feeling dismissed or disrespected by HCPs (Merrill & Grassley, 2008). Stigmatisation of
13 individuals who have obesity, has a negative impact on interactions with HCPs and
14 comorbidity management (Mold & Forbes, 2011; Multerud & Ulricksen 2011).

15 This study has implications for practice, as HCPs and weight-loss services provide an
16 important source of support for adults with overweight/obesity and CMP. However, our
17 findings suggest that support of affected individuals could be enhanced to facilitate uptake of
18 exercise. HCPs need to recognise the cyclical nature of the relationship between weight and
19 pain, and acknowledge pain as a barrier to weight loss.

20 These findings suggest that HCPs should ensure patients accurately understand the weight-
21 pain relationship. Masheb et al. (2015) and Ryan et al. (2017) reported that pain severity is
22 predictive of suboptimal weight loss outcomes, therefore management of patients with co-
23 morbidity should treat both conditions simultaneously. The objective of management should
24 be breaking the weight-pain cycle, and reducing fear-avoidance to enhance weight-loss effort.
25 This study has shown that as participants lost weight, fear of movement was reduced, and

1 engagement with exercise increased. While exercise alone may not result in substantial
2 weight loss, it has been shown that exercise combined with an energy reduced diet can result
3 in significant and long term weight loss, and reduced pain in a co-morbid population (Shaw,
4 Gennat, O'Rourke, & Del Mar, 2006, Messier et al. 2004, Messier et al 2013). Furthermore
5 exercise promotes additional physical and psychological health benefits, (Shaw et al. 2006)
6 and so should be encouraged in this population. Recognition that patients with a BMI in the
7 highest categories report increased pain and are more likely to avoid exercise, will enable
8 HCPs to advise appropriate and achievable levels of activity. Combining exercise advice
9 with effective pain management may result in increased self-efficacy and motivation in this
10 group.

11 HCPs also need to be aware of their own beliefs about CMP, and their attitude to individuals
12 with overweight/obesity, to ensure that management of patients with co-morbidity promotes
13 positive outcomes. Further research is needed to determine the most effective methods of
14 combined management to reduce pain and enhance weight loss. Investigation of HCPs
15 knowledge and understanding of the weight-pain relationship, and their attitudes to adults
16 with overweight/obesity and CMP, is required to determine gaps and inform the education of
17 HCPs.

18 Weight-loss service providers could offer additional services that take account of co-morbid
19 pain, such as exercise programmes and reward schemes designed specifically for chronic
20 pain conditions. Further research is needed to explore the role of commercial and public
21 weight-loss services in the management of adults with overweight/obesity and CMP.

22

23 **Strengths and limitations**

1 This study included predominantly female participants with pain who were actively engaged
2 in a weight loss programme in the UK, thus the findings may not transfer to other settings.
3 We sought a wide variety of ages to capture the different experiences of people from all age
4 groups: this could be viewed as both a strength and a weakness, as pain in older participants
5 could be attributed to age-related comorbidities as well as their weight. While IPA analysis
6 does not seek data saturation, it did occur in this study. In order to assure the trustworthiness
7 of findings all transcripts were read by two reviewers independently, coding was compared
8 and all authors discussed and confirmed emerging and final themes. In addition member
9 checking with participants occurred, and minority views were reported to enhance the
10 credibility of the findings. The narrative analysis was supported by verbatim extracts to
11 ensure dependability of the findings.

12

13

1 **Conclusions**

2 This study provides a unique understanding of the lived experience of individuals with co-
3 existing overweight/obesity and CMP, who are attempting to lose weight. Participants in this
4 study were aware of a relationship between their weight and pain. They clearly identified that
5 pain was a primary motivator for weight loss, while simultaneously creating a barrier to their
6 efforts to increase activity that would enhance weight-loss efforts. Fear of weight causing
7 further damage or increasing pain, played an important role in restricting activity, thus
8 indicating the need for HCPs and weight-loss service providers to acknowledge the
9 relationship between weight and pain. There is also a need to offer advice and simultaneous
10 management of both conditions, as well as support for individuals to engage with appropriate
11 exercise.

12 **Relevance to clinical practice:** Healthcare professionals need to understand the relationship
13 between weight and pain. They must be prepared to acknowledge and discuss the weight-pain
14 link with patients in order to ascertain patient understanding. HCPs should use therapeutic
15 communication to provide accurate information and reduce individuals' fear of weight
16 causing damage. Our findings suggest that both overweight/obesity and CMP should be
17 managed simultaneously. HCPs should employ strategies that support patients to gradually
18 increase exercise, and gain confidence that promotes increased self-efficacy in their weight-
19 loss efforts. It is also important to ensure that language used with this patient group does not
20 stigmatise individuals, or cause or exacerbate fear of normal movement.

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1 **References**

2

3 Blagojevic, M., Jinks, C., Jeffrey, A. & Jordan K.P. (2010) Risk factors for the onset of knee
4 osteoarthritis in older adults: a systematic review and meta-analysis. *Osteoarthritis &*
5 *Cartilage* 18, 24-33.

6

7 Bonakdar, R.A. (2013) Obesity related pain; time for a new approach that targets systemic
8 inflammation. *Journal of Family Practice* 62(9), 22-28

9

10 Cancer Research UK (2016) 'Tipping the scales: Why preventing obesity makes economic
11 sense', Cancer Research UK, UK Health Forum.

12

13 Cleeland, C. S. (1991) Pain assessment in cancer. In: Osoba D, ed. *Effect of Cancer on*
14 *Quality of Life*. Boca Raton, FL: CRC Press, Inc.:293-305

15

16 Craig, R., Fuller, E. & Mindell, J. (eds) (2015) *Health Survey for England 2014*, London: The
17 Health and Social Care Information Centre

18

19 Cutliffe, J.R. & McKenna H.P. (1999) Establishing the credibility of research findings: the
20 plot thickens. *Journal of Advanced Nursing* 30(2), 374-380

21

22 Darlo, B., Fullen, B.M., Dean, S., Hurley, D.A., Baster, G.D. & Dowell, A. (2012) The
23 association between health care professional attitudes and beliefs and the attitudes and

1 beliefs, clinical management, and outcomes of patients with low back pain: a systematic
2 review. *European Journal of Pain* 16, 3-17

3 de Rooij, M., Steultjens, M.P.M., Avazaat, E., Hakkinen, a., Klaver, R., van der Leeden, M.,
4 Maas, T., ... Dekker, J. (2013) Restrictions and contraindications for exercise therapy in
5 patients with hip and knee osteoarthritis and comorbidity. *Physical Therapy Reviews* 18(2)
6 101-111

7

8 Fildes, A., Charlton, J., Rudisill, C., Littlejohns, P., Prevost, T. & Gulliford, M.C. (2015)
9 Probability of an Obese Person Attaining Normal Body Weight: Cohort Study Using
10 Electronic Health Records. *American Journal of Public Health* 105(9) e54-9

11

12 Gatineau, M., Hancock, C. & Dent, M. (2013) *Adult obesity and disability*. Oxford: National
13 Obesity Observatory.

14

15 Houghton, C., Casey, D., Shaw, D., Murphy, K. (2013) Rigour in qualitative case-study
16 research. *Nurse Researcher*. 20, 4, 12-17.

17

18 International Association for the Study of Pain (2015) *IASP Taxonomy* [http://www.iasp-
20 pain.org/Taxonomy](http://www.iasp-
19 pain.org/Taxonomy)

21 Jackson, S.E., Wardle, J., Johnson, F., Finer, N., Beeker, R.J. (2013) The impact of a health
22 professional recommendation on weight loss attempts in overweight and obese british adults:
23 A cross-sectional analysis', *BMJ Open*, 3, pp.:e003693. doi: 10.1136/bmjopen-2013-003693

- 1 Janke, A.E., Collins, A. & Kozak, A.T. (2007) Overview of the relationship between pain and
2 obesity: What do we know? Where do we go next? *Journal of Rehabilitation Research &*
3 *Development*. 44(2) 245-262.
- 4
- 5 Janke, A.E. & Kozak, A.T. (2012) “The more pain I have the more I want to eat”: Obesity in
6 the context of chronic pain. *Obesity* 20, 2027–2034.
- 7
- 8 Janke, E.A., Ramirex, M.L., Haltzman, B.C., Fritz, M. & Kozak A.T. (2016) Patient’s
9 experience with comorbidity management in primary care: a qualitative study of comorbid
10 pain and obesity. *Primary Health Care Research & Development* 17 33-41
- 11
- 12 Malterud, K. & Ulricksen, K. (2011) Obesity, stigma, and responsibility in health care: A
13 synthesis of qualitative studies. *International Journal of Qualitative Studies on Health and*
14 *Well-being*. 6: 8404 - DOI: 10.3402/qhw.v6i4.8404
- 15
- 16 Masheb, R.M., Lutes, L.D., Hyungjin, M.K., Holleman, R.G., Goodrich, D.E....
17 Damschroder, L.J. (2015) Weight loss outcomes in patients with pain. *Obesity* 23(9):1778-84
- 18
- 19 McVinnie, D.S. (2013) Obesity and Pain. *British Journal of Pain* 7(4) 163-170
- 20

1 Merrill, E. & Grassley, J. (2008) Women's stories of their experiences as overweight patients.
2 *Journal of Advanced Nursing* 64(2), 139-146
3
4 Messier, S.P., Loeser, R.F., Miller, G.D., Valle, G., Morgan, T.P., Sevick, M.A.,...
5 Williamson, J.D. (2004) Exercise and Dietary Weight Loss in Overweight and Obese Older
6 Adults With Knee Osteoarthritis: The Arthritis, Diet, and Activity Promotion Trial (ADAPT)
7 *Arthritis & Rheumatism* 50(5) 1501-09
8
9 Messier S.P., Mihalko, S.L., Legault C., Miller, G.D., Nicklas, B.J., DeVita, P.,...Loeser,
10 (2013) Effects of Intensive Diet and Exercise on Knee Joint Loads, Inflammation, and
11 Clinical Outcomes Among Overweight and Obese Adults With Knee Osteoarthritis: The
12 IDEA Randomized Clinical Trial. *Journal of the American Medical Association*. 310(12),
13 1263-73.
14 Mold, F. & Forbes, A. (2011) Patients' and professionals' experiences and perspective of
15 obesity in health-care settings: a synthesis of current research. *Health Expectations* 16(2),
16 119-42
17 Morden, A., Jinks, C. & Ong B.N. (2014) '...I've Found Once the Weight Had Gone Off,
18 I've Had a Few Twinges, But Nothing Like Before'. Exploring Weight and Self-
19 Management of Knee Pain. *Musculoskeletal Care* 12(2), 63-73
20
21 National Institute for Clinical Excellence (2014) Managing overweight and obesity in adults -
22 lifestyle weight management services (ph53) <https://www.nice.org.uk/guidance/ph53>
23

- 1 National Institute for Clinical Excellence (2014) Osteoarthritis Care and Management.
2 CG177. 2014 <https://www.nice.org.uk/guidance/cg177/chapter/Introduction>
3
- 4 Pringle, J., Drummond, J., McLafferty, E.& Hendry, C. (2011) Interpretative
5 phenomenological analysis: a discussion and critique. *Nurse Researcher* 18(3), 20-24.
6
- 7 Prochaska, J.O. & DiClemente, C.C. (1983): Stages and Processes of Self-Change of
8 Smoking: Toward An Integrative Model of Change. *Journal of Consulting Clinical*
9 *Psychology* 51(3), 390-395
10
- 11 Ray, L., Lipton, R.B., Zimmerman, M.E., Katz, M.J. & Derby, C.A. (2010) Mechanisms of
12 association between obesity and chronic pain in the elderly. *Pain* 152, 53–9
13
- 14 Rutledge, D.N., Cantero, P.J. & Ruiz, J.E. (2012) Chronic pain management strategies used
15 by low-income overweight Latinos *Chronic Illness* 9(2) 133–144
16
- 17 Ryan, C.G., Vijayaraman, A., Denny, V., Ogier.A., Ells, L....Atkinson, G. (2017) The
18 association between baseline persistent pain and weight change in patients attending a
19 specialist weight management service PLOSone
20 <https://doi.org/10.1371/journal.pone.0179227>
- 21 Shaw, K.A., Gennat, H.C., O'Rourke, P. & Del Mar, C. (2006) Exercise for overweight or
22 obesity. *Cochrane Database of Systematic Reviews*, Issue 4. Art. No.: CD003817

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2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Shiri, R., Karppinen, J., Leino-Arjas, P., Solovieva, S. & Viikari-Juntura, E. (2010) The association between obesity and low back pain: a meta-analysis. *American Journal of Epidemiology* 171(2), 135-54

Smith, J.A., Flowers, P. & Larkin, M. (2009) *Interpretative phenomenological analysis: Method and application*. London. Sage.

Snaith, R.P. & Zigmond, A. R. (1994) *HADS: Hospital Anxiety and Depression Scale*. NFER Nelson. Windsor.

Stone, A.A. & Broderick, J.E. (2011) Obesity and pain are associated in the United States. *Obesity* 20(7) 1491-5

Stubbs, R.J., Morris, L., Pallister, C., Horgan, G. & Lavin, J.H (2015) Weight outcomes audit in 1.3 million adults during their first three months' attendance in a commercial weight management programme. *BMC Public Health* 15:882 DOI 10.1186/s12889-015-2225-0

Vincent, H.K., Vincent, K.R., Seav, A.N. & Hurley, R.W. (2011) Functional impairment in obesity: a focus on knee and back pain. *Pain Management* 1(5), 427-39

Vlaeyen, J.W. & Linton, S.J. (2012) Fear avoidance model of chronic musculoskeletal pain: 12 years on. *Pain** 153, 1144-1147

- 1 Wachholtz, A., Binks, M., Eisenson, H., Kolotkin, R.. & Suzuki, A. (2010) Does pain predict
 2 interference with daily functioning and weight loss in an obese residential treatment-seeking
 3 population? *International Journal of Behavioral Medicine*. 17 118-124.
- 4 World Health Organisation (2014). Obesity and overweight. Factsheet no. 311.

5 **Figure 1 Interview Guide**

6 **Interview Guide**

7

8 Tell me about how your pain started?

9

10 - Probe subjects introduced by the participant

11 - This may include affect on:-

12 o ability to work, socialise, exercise

13 - Explore further to see if participants response indicates that pain limits them in any way

14 (self-efficacy, pain catastrophizing)

15 o e.g. when you say you worry about being in pain, can you talk a bit more about this

16

17 Tell me when you first started seeking help for your weight?

18 - Probe/follow-up further on any subjects introduced by participant.

19 - This may include:-

20 o ability to do things they used to be able to do e.g. exercise, sport, work

21 o eating behaviour

22 o mood or relationships

23

24 Do you think there is any link between your pain and your weight?

25 - Help participants to clarify effects of weight on pain and vice versa

26

27 What kind of things help you to cope with the challenges of having pain and being overweight?

28 - Help participants to explore behaviour that they find helpful

23 **Table I Participant Characteristics (n = 18)**

24

Female	89% (n = 16)
Age: Range 29-71	Mean 53.5 (SD 11)

BMI: Range 25-45.9	Mean 33.27 (SD 5.94)
25-29.9 (overweight)	33% (n = 6)
30-34.9 (obesity class I)	22% (n = 4)
35-39.9 (obesity class II)	33% (n = 6)
≥40 (obesity class III)	10% (n = 2)

Number of pain sites: Range 1-11 Mean 5 (SD 2)

BPI (Scale 0-10)

Average pain score: Mean 4.6 (SD 2.2)

Pain affecting sleep	67% (n = 12)
Pain affecting enjoyment of life	83% (n = 15)
Pain affecting relationships	44% (n = 8)

1 **Table II Hospital anxiety and depression scores**

2

<u>Categories</u>	<u>Anxiety</u>	<u>Depression</u>
0-7 (Normal)	72% (n = 13)	67% (n = 12)
8-10 (Mild)	11% (n = 2)	11% (n = 2)
11-14 (Moderate)	17% (n = 3)	22% (n = 4)

3

4