1   **Title:** The relationship between multisite peripheral joint pain and physical activity levels in older

2   adults: a cross-sectional survey

3   **Running title:** Relationship between multisite joint pain and physical activity

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22   **Conflict of interest:**

23   All the authors have no conflict of interest to report.

24   **Author contribution:**

1 The study's research question, study design and analysis plan were conceived by as part of RDS PhD

2 thesis with ELH, KSD and GMH. Data cleaning and analysis were conducted equally by ML, RDS and

3 JGQ. Interpretation of findings were contributed by all authors, all authors also contributed to the

4 preparation of this manuscript.

5 **Abstract**

6 *Introduction*

7 Research on levels of physical activity (PA) in those with peripheral joint pain have only focused on

8 single sites, in the knee or hips. This study investigated the levels of PA in adults with single-site and

9 multisite peripheral joint pain compared to adults with no joint pain.

10 *Methods*

11 Analysis of a cross-sectional population survey mailed to adults aged ≥45 years (n=28,443) was

12 conducted. Respondents reported any peripheral joint pain in the last 12 months in either the hands,

13 hips, knees or feet; PA levels were self-reported using the short telephone activity rating scale. The

14 association between PA levels, peripheral joint pain and outcomes of health status (physical and

15 mental component scores, PCS and MCS, using SF-12) pain intensity (10-point scale) and health-

16 related quality of life (HRQoL) (EQ-5D) were investigated using analysis of variance and ordinal

17 regressions.

18 *Results*

19 Compared to those with no joint pain, all pain groups reported lower levels of PA: joint pain in one

20 site (OR=0.91, 0.83-0.99 95%CI); two sites (0.74, 0.67-0.81), three sites (0.65, 0.59-0.72) and four

21 sites (0.47, 0.42-0.53). Across all joint pain groups, levels of PA were associated with pain intensity,

22 physical health status, mental health status and HRQoL.

23 *Discussion*

1   Adults with more sites of peripheral joint pain were more likely to report lower levels of PA. Those

2   with more sites of pain and lower levels of PA reported poorer outcomes. Health care providers

3   should be aware that those with multisite joint pain are most likely to have low levels of PA.

4   **Keywords:** Physical activity, multisite peripheral joint pain, cross-sectional survey.

5   **Background**

6   Peripheral joint pain is common among adults aged 45 years and over within the UK with around

7   79% of all adults experiencing some joint pain in the hands, hips, knees and feet (Finney, Dziedzic,

8   Lewis, & Healey, 2017). In adults aged 45 years and over, osteoarthritis (OA) is the most common

9   cause of peripheral joint pain (Felson, 2009). OA is a clinical syndrome of joint pain causing varying

10   degrees of limitation in physical function and reduced quality of life (National Insitute of Health and

11   Care Excellence (NICE), 2014). Physical activity (PA) is recommended as a core treatment for all

12   adults with OA in the hands, hips, knees and feet, regardless of age, other co-existing health

13   conditions, level of pain or disability (NICE, 2014). To date, research on levels of PA in those with

14   peripheral joint pain have only focused on single joint sites such as the knee (Daugaard et al., 2018;

15   Glaviano, Baellow, & Saliba, 2017; Herbolsheimer et al., 2016; Sliepen, Mauricio, Lipperts, Grimm, &

16   Rosenbaum, 2018; Thoma et al., 2018; White et al., 2013) or the hip (De Groot, Bussmann, Stam, &

17   Verhaar, 2008; Holsgaard-Larsen & Roos, 2012) which were associated with lower levels of physical

18   activity compared to similar aged general populations adults. In addition to the clinical benefits that

19   therapeutic exercise has on outcomes for adults with OA (Uthman et al., 2013), levels of PA during

20   daily living are important as low levels of PA are associated with higher levels of pain intensity

21   symptoms and poorer physical functioning (Shim, Park, Kim, Kyung, & Shin, 2018; Stubbs, Hurley, &

22   Smith, 2015; Thoma et al., 2018; Timmermans et al., 2019).

23   Pain in multiple sites across all the body is common, a survey of Swedish adults aged 65 years and

24   over showed 38% reported two or more areas of pain on their body compared to only 12% that

25   reported pain in only one area (Dragioti, Larsson, Bernfort, Levin, & Gerdle, 2017). Adults with a

higher number of painful sites commonly report lower general well-being, lower self-reported

physical and mental health, more pain frequency, pain severity and increase risk of falls (Dragioti et

al., 2017; Finney, Dziedzic, Lewis, & Healey, 2017; Lacey et al., 2014; Welsh, Clarson, Mallen, &

McBeth, 2019). Despite over half of adults aged 45 years and over reporting multisite peripheral

joint pain in the hands, hips, knees and feet (Finney et al., 2017), there has been limited

investigation into PA levels in adults with multisite peripheral joint pain. Despite the emphasis on the

importance of regular PA in the management of joint pain, uptake of exercise as a treatment for

their pain appears to be underutilised, with predominate reliance on pharmacological treatment

(Healey et al. 2018). In adults with at least two sites of joint pain, only 30% participate in exercise as

treatment compared to 95% that report regular use of at least one analgesic medications (Raja et al.,

2016). There has been no study to date investigating the levels of PA in those with multisite joint

pain and the relationships between multisite peripheral joint pain, levels of PA and joint pain

symptoms or health outcomes.

The clinical guidelines that recommend PA as a core treatment for OA acknowledged many adults

will have OA in multiple sites (NICE, 2014). Currently, it is unclear what the uptake of PA is in UK

adults with multisite peripheral joint pain. The aim of this study was to determine levels of PA in

those with single-site and multisite peripheral joint pain (pain in two or more sites of the hands,

hips, knees or feet) compared to similar aged adults with no reported joint pain.

Methods

Design and participants

Secondary analysis was conducted of the cross-sectional population postal survey which was part of

the 'Managing Osteoarthritis in Consultations' MOSAICS study (Dziedzic et al., 2014). This study was

4

reported in accordance with the Strengthening the Reporting of Observational Studies in

Epidemiology (STROBE) guidelines for cross-sectional studies (Von Elm et al., 2007). The survey was

mailed to 28,443 adults aged 45 years and over, registered at eight participating general practices in

the West Midlands and North West of England between May 2011 and April 2012. General practice

characteristics varied in terms of: number of registered patients; number of clinical staff; practice

location (which included both urban and rural settings); and levels of local area deprivation. General

practitioners had an opportunity to screen and exclude ineligible participants for example those

unable to provide informed consent or had a recent family bereavement (Dziedzic et al., 2014).

Those flagged as excluded from research in that practice were excluded and those contacting the

research team indicating they did not wish to take part in the study were not contacted again. The

postal survey was mailed in a two-stage mailing process. The first stage included a letter of invitation

sent to participants and information about the MOSAICS study, and the survey. After two weeks,

non-responders were sent a reminder survey and letter. The study was approved by the North West

Midlands 1 Research Ethics Committee, Cheshire, UK, as part of the MOSAICS study (ISRCTN

number: ISRCTN06984617) (Dziedzic et al., 2014).

Data collection

The population survey collected participants' demographic information (age, gender, self-reported

height and weight), area deprivation for participants' postcode was measured in quintiles using the

Index of Multiple Deprivation (IMD) (Noble, Wright, Smith, & Dibben, 2006). The survey included

items asking participants if they experienced '*any pain in the last year in or around the hands, hips,*

knees or feet?' Participants were asked to score the average level of pain intensity on a 0-10

numerical rating scale in correspondence to each painful peripheral joint. Level of PA was measured

using the Short Telephone Activity Rating (STAR) scale (Matthews et al., 2005). The STAR

questionnaire is a short 3-item questionnaire, which measures frequency and duration of moderate

and vigorous activity. The STAR questionnaire categorises respondents into three levels of PA;

1 inactive (no moderate- or vigorous- intensity activity in a normal week), somewhat active (some

2 moderate- or vigorous- intensity, but insufficient amounts to recommended levels) and active to

3 recommended levels (moderate intensity for 5 d·wk^{-1} and 30 min·d^{-1} (5 30) or vigorous intensity for

4 3 d·wk^{-1} and 20 min·d^{-1}) (Haskell et al., 2007). The STAR has demonstrated test-retest reliability and

5 construct validity in relation to objective activity monitoring in general adult populations (Matthews

6 et al., 2005). Those that did not complete the STAR in the population survey were excluded from this

7 analysis. Other measures in the survey included general health status measured using the SF-12 in

8 the physical component scale (PCS) and mental component scale (MCS)(Ware Jr, Kosinski, & Keller,

9 1996) and health-related quality of life (HRQoL) using the EQ-5D 3L (EuroQol, 1990).

10 *Statistical analysis*

11 Descriptive statistics were used in stratified data by the number of joint pain sites; those with no

12 joint pain, single site joint pain, joint pain in any two sites, any three sites or all four sites, displaying

13 participants' demographic data and reported outcomes. Proportions or means and standard

14 deviations (SD) were calculated for each participants' demographic data or reported outcome. In

15 participants with more than one pain site, average pain intensity was calculated as a mean score

16 across the different sites of joint pain (Finney et al., 2015). Mean difference in demographics and

17 reported outcomes between groups were tested using an unadjusted one-way ANOVA, and linear

18 trends were tested using linear contrasts. The association between the number of joint pain sites

19 (those with no reported joint pain taken as the reference group) and levels of PA was investigated

20 using proportional odds ordinal regression model. Adjustments for potential confounding were

21 made in covariates: age, gender, deprivation score and BMI were used in the ordinal regression

22 models that compared levels of PA between joint pain groups.

23 In those with self-reported joint pain, we compared the general health status (PCS and MCS), HRQoL

24 and average pain intensity across the levels of PA within each number of joint pain sites using

25 unadjusted one-way ANOVA. Linear trends between levels of PA within each joint pain group were

1 tested using linear contrasts. All analyses were conducted using STATA v14.1. An alpha level of 5%

2 was used.

3

4 **Results**

5 The MOSAICS population survey was sent to 28,443 eligible adults, 15,083 (53%) returned the

6 survey, of those 14,796 (98%) completed the STAR questionnaire and were included in this study.

7 There were 11,777 (79%) responders that reported peripheral joint pain (**figure 1**). **Table 1** shows

8 the characteristics and self-reported levels of PA of the responders that returned the survey and

9 completed the STAR questionnaire. Single site peripheral joint pain was most commonly reported

10 (31%), followed by two-site (30%), three-site (21%), and four-site peripheral joint pain being

11 reported the least (18%). In those reporting any peripheral joint pain; 8,101 (69%) reported multisite

12 peripheral joint pain. Overall, as the number of reported sites of peripheral joint pain increased so

13 did age, BMI and average pain intensity. Physical and mental health status and HRQoL worsened as

14 the number of reported site peripheral joint pain increased. Participants who reported peripheral

15 joint pain in three or four sites were more likely to live in areas of higher deprivation compared to

16 those who reported no peripheral joint pain.

17 *Self-reported levels of physical activity*

18 Responders with no peripheral joint pain reported being the most active compared to those

19 reporting peripheral joint pain. Those with more sites of joint pain were less likely to be categorized

20 as "active" with odd ratios ranging from OR=0.91 (0.83-0.99, 95%CI) for one site of joint pain to

21 OR=0.47 (0.42-0.53, 95%CI) for those with all four sites of joint pain (**table 1**). When examining levels

22 of PA in those with single site joint pain, only those with pain in the hips reported a significantly

23 lower levels of PA compared to those with no reported joint pain (OR=0.82, 0.70-0.96 95%CI) (**table**

24 **2**).

1   Average joint pain intensity was lower in those reporting higher levels of PA for each of the joint pain

2   groups (**table 3**). Those with four-sites of joint pain and scored as inactive reported the highest

3   average pain intensity across all joint pain groups (6.4±2.1) and those with one-site of joint pain

4   scored as active reported the lowest average pain intensity (3.2±2.1). Linear trends for average pain

5   intensity and PA levels were observed within all groups of joint pain (**table 3**). The same patterns

6   were shown for PCS, MCS and HRQoL with higher scores for those that reported higher levels of PA

7   across all single and multisite joint pain groups (**table 3**).

8   **Discussion**

9   *Main findings*

10   This study investigated the self-report levels of PA in those with and without multisite peripheral

11   joint pain. Overall, levels of PA tended to be highest among those who reported no peripheral joint

12   pain. Those with fewer sites of joint pain were more likely to be categorised as "active" compared to

13   those with more sites of joint pain. Self-report levels of physical inactivity ranged from 10.2% in

14   those with no joint pain to 22.9% in joint pain with all four sites. When comparing location of pain in

15   those with single-site peripheral joint pain to those with no joint pain, only those experiencing hip

16   pain were significantly less likely to be more physically active, although non-significant trends

17   towards lower levels of PA were observed among the other pain sites. This suggests that while hip

18   pain could be associated with lower levels of PA, location of different sites of joint pain were not

19   significantly related to different levels of PA. Although only a subgroup of the study' responders

20   were used to explore the relation between levels of PA and different locations of single site joint

21   pain. There were associations between pain intensity and levels of PA within those reporting one,

22   two, three and four sites of peripheral joint pain. Adults with more pain sites were less active and

23   had poorer physical health, mental health, HRQoL and higher average pain intensity. For example,

24   those with four sites of joint pain that reported as physically active had lower average pain intensity

25   scores compared to those with three sites scoring somewhat active and inactive.

Comparison with other studies

While this is the only study to-date that has explored different levels of PA in multisite joint pain, some of the findings from this study show similarities with other studies exploring multisite pain and clinical outcomes. Similar to our findings, other studies have shown multisite joint pain to be associated with more pain intensity, lower well-being and poorer health status (Dragioti et al., 2017; Finney et al., 2017).

Self-report levels of PA in our study showed a similar pattern with other studies comparing those with joint pain or OA to general populations; those with peripheral joint pain reporting lower overall levels of PA compared to those with no reported pain. However, the sample in this study appeared to have reported higher levels of PA compared to other studies measuring PA in adults with knee or hip OA (Herbolsheimer et al., 2016; Shim et al., 2018; Thoma et al., 2018; Timmermans et al., 2019). Within those with one to four sites of peripheral joint pain; 10-23% reported as inactive, and 36-53% reported as active compared to other studies in knee OA where objectively measured levels of inactivity were 61% and 25% were active (Sliepen et al., 2018).

Strengths and limitations of the study

There are a number of strengths and limitations of this study. The strengths included the large survey sample size allowing for adequate precision in reporting estimates across multiple groups (for example measuring the association between levels of PA and number of joint pain sites). When measuring for possible relationships between PA, different levels of single-multisite peripheral joint pain and health-related outcomes, the risk of confounding was reduced by adjusting for age, gender and BMI; and the general practices participating in this survey were selected to be generally representative of the UK adult population as a whole (Dziedzic et al., 2014).

Limitations included the use of the STAR questionnaire, which had been closely related to objective measures of PA in adults (Matthew et al., 2005), had not been validated in older adults with joint

1 pain and so may have overestimated true levels of PA in this study sample. This is likely, as other

2 self-report measures have been shown to overestimate levels of PA in adults with peripheral joint

3 pain when compared to objective measures. This could be the case for the STAR questionnaire and

4 any self-report measures of PA in OA may also be influenced by social desirability bias, recall bias or

5 over- and underestimation of activities (Casartelli, Bolszak, Impellizzeri, & Maffiuletti, 2015; Healey

6 et al., 2020). As our study measured multisite peripheral joint pain, pain intensity for multiple sites

7 were measured for each individual site, we approached this with mean values as the most

8 representative of an individuals' global experience of joint pain, compared to taking the highest

9 value of pain intensity (Finney et al., 2017). Finally, we are unable to infer causation from this cross-

10 sectional study due to a lack of temporal data. Despite these limitations, the main findings of this

11 study are supported by other related studies and remain relevant (Dragioti et al., 2017; Finney et al.,

12 2017; Sliepen et al., 2018).

13 *Implications for research and clinical practice*

14 The findings from this study suggest that multisite joint pain is common and those with it are at high

15 risk of having lower levels of PA. People with multisite joint pain attributed to OA are an important

16 group to target to increase PA levels and improve general health. However, the presence of multisite

17 pain may also be an important barrier to regular PA and further studies could investigate this

18 relationship over time and explore how best to tailor future PA interventions to increase PA levels

19 for multisite peripheral joint pain. This is important given the lack of evidence around the

20 management of multisite peripheral joint pain (Finney et al., 2016). A positive clinical message that

21 emerges from our study is that despite high levels of pain intensity and multisite pain many adults

22 did remain active and qualitative research learning *how* this sub-group does so may provide insight

23 to help tailor interventions for others with multisite joint pain.

24 *Conclusion*

1   Peripheral joint pain is common among adults aged 45 years and over, with the majority of those

2   having pain in more than one site. Those with peripheral joint pain are more likely to be less

3   physically active compared to adults with no reported joint pain and those with more sites of joint

4   pain the most likely to be less physically active. Health providers need to be aware of the clinical

5   benefits of PA for those with peripheral joint pain in outcomes such as pain intensity, physical

6   health, mental health and HRQoL, but adults with multisite joint pain would potentially benefit more

7   given observed inequality for health related outcomes given their low PA levels.

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Table 1. Descriptive statistics of demographic and reported outcomes across different joint pain groups

	No joint pain (n=3019)	Joint pain in one site (n=3676)	Joint pain in two sites (n=3522)	Joint pain in three sites (n=2656)	Joint pain in four sites (n=1923)	Difference between group	Linear trend
Age, mean (SD)	62.3 (11.2)	63.0 (11.1)	63.7 (11.0)	64.7 (11.1)	66.2 (10.9)	*F*=45.3 *p*=<0.001	*F*=175.4 *p*=<0.001
BMI Kg.m^2, mean (SD)	24.5 (7.5)	25.3 (7.2)	25.9 (8.0)	26.1 (9.0)	26.5 (9.9)	*F*=26.0 *p*=<0.001	*F*=98.1 *p*=<0.001
IMD quintile, n (%)							
1 (most affluent)	969 (32.1)	1230 (33.5)	1099 (31.2)	726 (27.3)	451 (23.5)		
2	882 (29.2)	1029 (28.0)	1003 (28.5)	805 (30.3)	520 (27.0)		
3	623 (20.6)	763 (20.8)	710 (20.2)	533 (20.1)	442 (23.0)		
4	333 (11.0)	416 (11.3)	418 (11.9)	341 (12.8)	279 (14.5)		
5 (most deprived)	212 (7.0)	238 (6.5)	292 (8.3)	251 (9.5)	231 (12.0)		
Adjusted OR (95%CI)		0.96 (0.88-1.05)	1.07 (0.99-1.17)	**1.23 (1.12-1.36)**	**1.58 (1.43-1.76)**		
Average pain intensity, mean (SD)	NA	3.5 (2.3)	3.9 (2.1)	4.4 (2.1)	5.2 (2.2)	*F*=280.0 *p*=<0.001	*F*=821.8 *p*=<0.001
Health status, mean (SD)							
PCS	50.8 (12.6)	47.6 (13.3)	43.9 (13.6)	39.3 (14.5)	33.7 (14.3)	*F*=606.8 *p*=<0.001	*F*=292.1 *p*=<0.001
MCS	51.3 (12.8)	50.4 (12.9)	49.0 (13.0)	46.9 (14.0)	43.9 (14.9)	*F*=117.7 *p*=<0.001	*F*=442.9 *p*=<0.001
EQ-5D, mean (SD)	0.91 (0.16)	0.83 (0.19)	0.74 (0.22)	0.65 (0.28)	0.52 (0.33)	*F*=150.5 *p*=<0.001	*F*=469.3 *p*=<0.001
Level of PA, n (%)							
Inactive	307 (10.2)	356 (9.7)	437 (12.4)	400 (15.1)	440 (22.9)		
Somewhat active	1100 (36.4)	1501 (40.8)	1552 (44.0)	1190 (44.8)	838 (43.6)		
Active	1612 (53.4)	1819 (49.5)	1533 (43.5)	1066 (40.1)	645 (33.5)		
Adjusted OR (95%CI)		**0.91 (0.83-0.99)**	**0.74 (0.67-0.81)**	**0.65 (0.59-0.72)**	**0.47 (0.42-0.53)**		

Key: Values in **bold** represent statistical significance *p*<0.05. SD=standard deviation, BMI= body mass index, IMD=indices of multiple deprivation, OR=odd

ratio, PCS=physical component score, MCS=mental component score, EQ-5D= EuroQol 5-diemensions, PA= physical activity.

Table 2. Levels of self-reported physical activity in participants that reported no peripheral joint pain or a single peripheral joint pain by site.

	Inactive, n (%)	Somewhat active, n (%)	Active, n (%)	Adjusted OR (95%CI)
No peripheral joint pain (n=3019)	307 (10.2)	1100 (36.4)	1612 (53.4)	
Hip pain only (n=724)	94 (13.0)	283 (39.1)	347 (47.9)	**0.82 (0.70-0.96)**
Knee pain only (n=1471)	130 (8.8)	610 (41.5)	731 (49.7)	0.91 (0.81-1.02)
Hand pain only (n=798)	63 (7.9)	334 (41.9)	401 (50.3)	0.97 (0.84-1.12)
Foot pain only (n=683)	69 (10.1)	274 (40.1)	340 (49.8)	0.89 (0.77-1.06)

Key: Values in **bold** represent statistical significance *p*<0.05. OR=odd ratio.

Table 3. Pain intensity, health status and quality of life across levels of physical activity within different joint pain groups.

	Inactive	Somewhat active	Active	Difference between group	Linear trend
Pain intensity, mean (SD)					
One site	4.4 (2.7)	3.6 (2.3)	3.2 (2.1)	*F*=41.4, *p*=<0.001	*F*=415.6, *p*=<0.001
Two sites	4.7 (2.3)	4.1 (2.1)	3.6 (1.9)	*F*=54.4, *p*=<0.001	*F*=448.8, *p*=<0.001
Three sites	5.5 (2.3)	4.5 (2.0)	3.9 (1.9)	*F*=93.7, *p*=<0.001	*F*=722.1, *p*=<0.001
Four sites	6.4 (2.1)	5.1 (2.0)	4.4 (2.0)	*F*=131.9, *p*=<0.001	*F*=252.9, *p*=<0.001
Health status PCS, mean (SD)					
No joint pain	41.6 (16.9)	49.8 (13.1)	53.3 (10.1)	*F*=127.3, *p*=<0.001	*F*=235.2, *p*=<0.001
One site	37.4 (16.2)	46.4 (13.2)	50.5 (11.5)	*F*=169.3, *p*=<0.001	*F*=313.1, *p*=<0.001
Two sites	33.6 (15.7)	42.5 (13.2)	48.3 (11.3)	*F*=240.9, *p*=<0.001	*F*=471.0, *p*=<0.001
Three sites	27.7 (14.2)	38.4 (13.6)	44.8 (12.5)	*F*=243.3, *p*=<0.001	*F*=471.2, *p*=<0.001
Four sites	24.4 (11.7)	33.6 (12.9)	40.2 (14.2)	*F*=190.1, *p*=<0.001	*F*=375.1, *p*=<0.001
Health status MCS, mean (SD)					
No joint pain	46.2 (16.2)	50.2 (13.5)	52.9 (11.2)	*F*=42.8, *p*=<0.001	*F*=84.5, *p*=<0.001
One site	46.0 (15.8)	49.5 (12.8)	51.9 (12.1)	*F*=37.1, *p*=<0.001	*F*=73.0, *p*=<0.001
Two sites	43.4 (13.1)	48.4 (13.1)	51.3 (11.5)	*F*=66.3, *p*=<0.001	*F*=128.4, *p*=<0.001
Three sites	39.8 (16.4)	46.0 (13.8)	50.4 (12.1)	*F*=93.0, *p*=<0.001	*F*=183.4, *p*=<0.001
Four sites	37.4 (15.2)	44.4 (13.9)	47.6 (14.6)	*F*=66.7, *p*=<0.001	*F*=125.7, *p*=<0.001
EQ-5D, mean (SD)					
No joint pain	0.79 (0.27)	0.90 (0.14)	0.94 (0.11)	*F*=127.5, *p*=<0.001	*F*=246.3, *p*=<0.001
One site	0.69 (0.27)	0.81 (0.19)	0.87 (0.15)	*F*=140.9, *p*=<0.001	*F*=263.6, *p*=<0.001
Two sites	0.57 (0.30)	0.73 (0.22)	0.81 (0.17)	*F*=213.5, *p*=<0.001	*F*=408.6, *p*=<0.001
Three sites	0.38 (0.35)	0.64 (0.25)	0.75 (0.19)	*F*=298.7, *p*=<0.001	*F*=596.6, *p*=<0.001
Four sites	0.25 (0.34)	0.54 (0.30)	0.67 (0.22)	*F*=267.2, *p*=<0.001	*F*=526.8, *p*=<0.001

Key: Values in **bold** represent statistical significance *p*<0.05. SD=standard deviation, PCS=physical component score, MCS=mental component score, EQ-5D=

EuroQol 5-diemensions.

Figure 1. Flowchart of responses to the MOSAICS population survey