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The relative importance of psychosocial factors in arthritis: Findings from 10,509 Australian women

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Abstract

Objective: To determine the relative importance of psychosocial factors in arthritis diagnosis in an ageing cohort of Australian women.

Methods: This study focused on 10,509 women from the 1946-1951 cohort who responded to questions on arthritis in the fifth mailed population-based survey of the Australian Longitudinal Study on Women's Health conducted in 2007.

Results: Arthritis was characterised by widespread psychosocial concerns, particularly relating to chronic stress and poor mental health. Univariate analyses revealed that in comparison to women without stress, women with moderate/high stress levels had a 2.5-fold increase in reporting arthritis. Experiencing ongoing negative interpersonal life events concerning illness of a family member/close friend and relationship difficulties was also associated with a 1.4-fold increase in the reporting of arthritis. Likewise, significantly reduced levels of optimism and perceived social support were noted (all associations $p < 0.001$). Psychiatric diagnosis was also associated with a two-fold increase in having arthritis ($p < 0.001$). Following adjustment for behavioural, demographic and health-related characteristics, anxiety was the only psychosocial factor associated with arthritis (OR=1.4, 95% CI=1.2, 1.7; $p < 0.001$).

Conclusion: This study examined, epidemiologically, the relative importance of psychosocial factors in arthritis in an ageing cohort of Australian women. The findings from this population-based study indicate that women with arthritis are more likely to report a range of psychosocial-related problems, particularly with regard to chronic stress perception and anxiety. Longitudinal analyses are required to examine the processes by which stress and

psychosocial factors may contribute to arthritis risk and poor adaptation in terms of health-related quality of life.

Keywords: ageing; anxiety; arthritis; psychosocial health; psychological stress; women

Arthritis represents an ongoing public health challenge. The disease contributes substantially to global healthcare expenditure and is a major cause of disability, limited mobility and chronic pain [1-4]. The prevalence of arthritis has been estimated to be around 20%, with figures often exceeding 50% when focused on middle-aged and older adults [5-7]. Arthritis also disproportionately affects women and when present post-menopause is more debilitating [8, 9]. With significant variability associated with arthritis disability, factors extraneous to the disease may contribute to the burden of arthritis, particularly for women as they age [3, 4]. As such, it is pertinent to understand factors contributing to the disease burden that may provide additional avenues for intervention. Limited epidemiologically-based research exists regarding the relative importance of psychosocial factors in arthritis diagnosis for women as they age. As such, this will provide the focus of this paper.

The influence of psychosocial factors on disease processes in arthritis has primarily focused on psychological adaptation (most notably depression). However, inconsistent evidence for an increased association between poor mental health and arthritis has been found [10-14]. Hawley and Wolfe [15] in a 10 year study of consecutive rheumatoid arthritis (RA) outpatients found that 20% fulfilled criteria for 'probable' depression, while cross-sectionally, Ho and colleagues found that 15 and 26% of RA patients reported depression and anxiety, respectively [16]. Similar findings have been reported for osteoarthritis (OA) populations [17]. When specifically focused on women, El-Miedany and El Rasheed noted that around 60% of women with RA experienced depression, with anxiety found to approach 70% [14]. Meanwhile, prospective findings indicate that the prevalence or severity of depression in RA is not dissimilar to individuals with other chronic diseases, and as such may be a factor of reduced health-related quality of life and not a function of the disease, per se [15]. In a cohort study, Courvoisier et al. [18] found pain to be the most important predictor

of psychological health. Thus, it is important to understand the role of psychosocial factors within a comprehensive model, taking into account current health perceptions.

Psychological stress may also play an important role in the poor adjustment to arthritis, particularly for women. The majority of stress-related research within the arthritis field has focused on the occurrence of major or minor negative life events in relation to symptom expression or psychological adaptation in RA [19-24]. Turner et al. [21] found that patients who experienced more chronic major and minor daily stressors over a six month period experienced poorer mood, while Treharne and colleagues [20] noted that greater life stress impacted psychological well-being over the course of the disease, particularly in relation to anxiety. Additionally Thomason et al. [23] found that following the adjustment for disease severity and major life stress, minor stressful life events accounted for a significant amount of the variance associated with inflammation levels. Other studies, depending upon the stress measurement employed and covariates examine have produced null and negative findings [25, 26]. In one of the few studies to examine specific life events in relation to disease onset, Fuller-Thomson and colleagues [27] found that physical abuse was associated with a two-fold increase in being diagnosed with OA in adulthood, following the adjustment for demographics. The findings, however, are limited as the researchers did not control for additional psychosocial processes or traditional arthritis risk/protective factors, such as obesity.

Moreover, it is increasingly being acknowledged that stress appraisal (i.e. the extent to which an event is perceived as stressful) in the absence of perceived personal coping resources (such as social support and personality characteristics) may be more critical to the adjustment process and as such may have a greater impact on the disease than the exposure to chronic stressors [28]. Particularly, Epel and colleagues [29] have demonstrated that chronic perceived stress is associated with key physical markers of cellular ageing, with high levels

of perceived stress found to increase cellular ageing by one decade in comparison to women with low stress levels. Research related to the impact of perceived stress on women with arthritis however is limited. Curtis and colleagues [30] found perceived stress to be associated with affective disturbance in Irish women with established RA (mean age = 60 years), while Zautra and Smith [31] in their study of postmenopausal women with RA and OA found perceived stress to be associated with both pain sensitivity and poor mood. Interpersonal stress has also been found to be associated with elevated biological and clinical markers of disease activity in American women with RA [32]. Studies to date however have generally focused on small RA sub-samples and have failed to consider various aspects of the stress process (including additional psychosocial factors that may facilitate the response) within the one model, thereby limiting the scope of their findings [30, 33].

Given arthritis is projected to affect upwards of 40% of women by the year 2050 [1, 34] and women have been found to have greater stress reactivity in comparison to men, particularly as they age [35, 36], it is pertinent to gain an understanding of how psychosocial processes may be associated with arthritis at an epidemiological level, taking into account factors that influence psychosocial health including traditional risk/protective factors and current health perceptions. Therefore, the aim of this study is to determine the relative importance of psychosocial factors in arthritis diagnosis using a broadly representative cohort of ageing Australian women.

Methodology

Overview of the Australian Longitudinal Study on Women's Health (ALSWH): The ALSWH is a longitudinal cohort study assessing physical, psychological, environmental, social and economic factors in Australian women. Using self-report mailed surveys, in excess of 42,000 women were randomly recruited through the national health insurer's database

(Medicare Australia). To ensure an adequate representation of Australian women, a stratified random sampling frame was used with women from rural and remote areas sampled at twice the rate as those from urban areas [37]. This project has ongoing ethical clearance from both the University of Newcastle and University of Queensland's Human Research Ethics Committees.

Sample: For the purposes of this study, data from the 1946-1951 cohort who completed the fifth survey in 2007 were analysed. Of the 14,099 women who responded to the initial invitation in 1996, 10,638 (75.5%; unweighted data) women aged between 56 and 61 years completed the follow up survey in 2007. This sample was found to be largely representative of the original cohort, with a slight over-representation of married, Australian born and tertiary educated women [38]. The final sample for this analysis however, related only to those women who responded to the questions about arthritis diagnosis. The final sample comprised 10,509 (74.5%) women (unweighted data).

Measures

Arthritis case definition (outcome variable): 'Arthritis' was defined as those women who reported being diagnosed with, or treated for OA, RA, or another form of arthritis (other), in the past three years at survey 5. As there are inherent difficulties associated with the self-reporting of specific arthritis forms [39], responses were dichotomised to indicate the presence or absence of at least one form of arthritis.

Psychosocial factors: The Perceived Stress Scale [40] was used to assess levels of psychological stress across ten life domains, including own health, health of a family member, money and personal relationships. Women were asked to rate how stressed they had felt in these areas within a 12 month period on a five point likert-type scale from 'not stressed at all' to 'extremely stressed'. Mean scores were aggregated into 'no stress' (mean score of

0), 'minimal stress' (scores >0 and ≤ 1) and 'moderate/high stress' (scores >1). This method of classification has been previously adopted [41, 42]. This scale has been found to have acceptable psychometric properties [43]. Cohort-specific life events were extracted from a modified version of the Life Event Questionnaire [44]. Women were asked to indicate whether they had experienced life events of varying severity and chronicity including a significant trauma (e.g. death of a spouse) or constant sources of stress (e.g. financial difficulties) in the previous 12 months. Women were considered to have depression or anxiety if they reported being diagnosed with, or treated for these conditions in the past three years [45].

The abbreviated version of the Medical Outcomes Study Social Support Survey [46] was used to measure perceived social support. This version includes two items from each of the emotional/informational, tangible and affectionate/positive social interaction scales. Respondents were asked to rate how often these types of support were made available to them when needed, on a five point likert-type scale from 'none of the time' to 'all of the time'. Mean scores for the scale were aggregated into 'all of the time' (scores >4 and ≤ 5), 'most of the time' (scores >3 and ≤ 4), 'some of the time' (>2 and ≤ 3) and 'none/little of the time' (scores ≤ 2). The abbreviated index has shown strong agreement with the original 19 item scale [40]. The revised Life Orientation Test (LOT-R) [47] was used as a measure of dispositional optimistic life approach. For the purposes of the study, only the six active items related to positive and negative expectations were utilised. Summed scores ranged from 0-30, with higher scores reflecting more optimism. Through confirmatory analysis, the LOT-R for the 1946-1951 cohort was found to represent a unifactorial construct with high internal reliability (Cronbach's $\alpha = 0.84$) [40].

Covariates: The following arthritis risk/protective factors and current health perceptions were included in the multivariate model. Body Mass Index (BMI) was calculated for each

participant from self-report height and weight according to the World Health Organization guidelines [48]. BMI was aggregated into four categories: 'underweight', 'healthy', 'overweight' and 'obese'. Alcohol consumption was determined from survey items relating to frequency and quantity. Alcohol risk was categorised into 'low risk', 'moderate risk', high risk' and 'non-drinker' [49]. Women were also classified according to cigarettes smoked each day as 'non-smoker', 'ex-smoker', and current smoker' using a modified version of the Australian Institute of Health and Welfare data dictionary [50]. Additional demographics included age, marital status, socioeconomic status (assessed as the highest educational qualification), and area of residence (categorised according to the Rural Remote and Metropolitan Areas classification system) [51]. Further, menopause status was determined on the basis of self-reported menstrual bleeding [52], while current hormone replacement therapy was assessed in a separate question. Meanwhile, health-related quality of life was assessed using the standard Australian version of the Medical Outcomes Study Short Form-36 (SF-36) [53]. This measure provides information on health perceptions across eight domains including physical, mental health and social functioning, general health, vitality, bodily pain and role limitations (physical or emotional). The SF-36 has been extensively validated and possesses high internal consistency, test-retest reliability, and responsiveness [54]. The appropriateness of the SF-36 as a measure of health-related quality of life within arthritis populations has been validated [55].

Statistical analyses: Univariate analyses were initially conducted in order to examine the psychosocial factors associated with arthritis status. Chi square analyses (for categorical variables) and independent t-tests (for continuous variables) were employed to report differences between women who had arthritis from those who did not. Unadjusted logistic regression analyses were carried out to examine the odds ratios (95% CI) associated with arthritis status and individual variables. In accordance with ALSWH recommendations for

data analysis, univariate analyses were weighted for area to correct for the oversampling of women from rural and remote areas. A final multivariate model adjusting for behavioural, demographic (including 'area of residence' in order to correct for the oversampling of rural/remote women) and health-related characteristics was then constructed using a backward stepwise procedure. All psychosocial and confounding variables were entered equally in the initial model and variables found not to contribute significantly to the model were manually eliminated. Due to the large sample size, statistical significance was set at $p < 0.005$. All analyses were conducted using the software package SPSS v.19 (SPSS Inc., Chicago, IL, USA).

Results

Sample characteristics: A total of 3025 (29.1%; weighted for area) women in the 1946-1951 cohort reported being diagnosed with, or treated for arthritis in the previous three years. Of these women, 410 reported more than one arthritis condition. While women with arthritis were on average slightly older than women without arthritis (58.6 ± 1.5 and 58.5 ± 1.5 respectively), the majority of women from both groups were involved in partnered (i.e. married or de facto) relationships (75.8% vs. 77.7%) and situated in urban area (68.6% vs. 67.2%) (see Table 1). Women with arthritis however, reported lower levels of educational attainment than other women. While almost half of women in both groups had achieved lower levels of formal education (i.e. 12 years or less), significantly more women with arthritis reported no formal education (19.6% vs. 13.3%). When entered into the final multivariate model, however, the association between all demographic variables (with the exception of age; OR=1.1; 95% CI=1.0, 1.1; $p < 0.005$) and arthritis status became non-significant (data not shown).

Psychosocial characteristics: At a univariate level, the strongest psychosocial factor associated with arthritis was the presence of perceived stress (see Table 2). Relative to experiencing no stress, women experiencing minimal levels of stress were 1.6 times more likely to have arthritis (95% CI=1.4, 1.9; $p<0.001$). Likewise, women reporting moderate to high levels of stress were 2.6 times more likely to be diagnosed with arthritis compared to women experiencing no stress (95% CI=2.1, 3.1; $p<0.001$). Of the negative life events examined, significant associations were found between having a family member or close friend with a major illness (unadjusted OR=1.4, 95%CI=1.3, 1.5; $p<0.001$), experiencing interpersonal/relationship difficulties (unadjusted OR=1.4, 95% CI=1.2, 1.6; $p<0.001$) and financial strain (unadjusted OR=1.2, 95% CI=1.1, 1.3; $p<0.005$) and arthritis status. Further, being diagnosed with a mental health disorder (both depression and anxiety) was associated with a two-fold increase in self-reporting arthritis. There was also a trend towards statistical significance for death of a family member or close friend ($p<0.01$).

Meanwhile, an inverse association between positive life approach (as measured by the LOT-R) and arthritis was identified (unadjusted OR=0.93, 95%CI=0.92, 0.93; $p<0.001$). At a univariate level, women who were less likely to perceive adequate availability of social support were more likely to report arthritis. In particular, compared to women who had functional forms of social support available all the time, women who were more likely to have functional forms of social support available occasionally or not at all were 1.5 times more likely to report a diagnosis of arthritis (95% CI=1.3, 1.8; $p<0.001$). At a multivariate level, although perceived social support, positive life approach, and having a family member/close friend with a major illness remained in the final model, having an anxiety disorder was the only statistically significant psychosocial factor related to self-reported arthritis (see Table 2). As such, being diagnosed, or treated by a physician in the past three

years for an anxiety disorder was associated with a 1.5-fold increase in self-report arthritis (95% CI=1.2, 1.7; $p<0.001$).

Discussion

This study examined the relative importance of psychosocial factors in arthritis in a nationally representative sample of ageing women. The findings suggest that women with arthritis have widespread psychosocial concerns, particularly relating to chronic stress perception and poor mental health. Most importantly, for women, being diagnosed with an anxiety disorder was associated with significantly greater odds of reporting arthritis, a factor that remained as the only statistically significant psychosocial factor associated with arthritis at a multivariate level. The findings of this study add important information to the wider body of knowledge surrounding the role of psychosocial factors in arthritis and also provide a unique perspective regarding the psychosocial experience of women as they age. Particularly, these women transitioning from midlife to older age appear to have psychosocial needs that may benefit from targeted clinical interventions aimed at reducing chronic stress and anxiety.

The findings of this study are strengthened by a number of factors. Firstly, the results are based on a nationally representative cohort sample involving over 10,000 women. This large sample size allowed us to control for a comprehensive range of risk/protective factors and health perceptions that may influence the arthritis experience. Additionally, we were able to examine various aspects of the stress process within the one model. The failure to include (or control) for aspects of the stress process (such as life events or stress perception) within the same model is a criticism of previous research.

Most notably, the multivariate analysis showed that women with anxiety/nervous disorder were more likely to report being diagnosed with arthritis. Our understanding of the anxiety-arthritis connection remains poorly understood, with the majority of research focused on

psychiatric illness primarily concentrating on the role of depression, or psychological distress [13, 56]. In our study, although women with arthritis were at an equally heightened risk for being treated for depression or anxiety at a univariate level, depression did not contribute to the final model. These findings support the work of Smith and Zautra [57] who found that when examined separately, depression and anxiety had similar effects on the reporting of weekly pain. However, when examined in concert, depression was reduced to non-significance. Our finding extends that of Smith and Zautra [57] by examining mental health within a comprehensive model, controlling for health-related factors that may influence the arthritis experience for women. In addition, by using a national sample, as opposed to a convenience sample, we were able to provide findings that may be generalisable to similar ageing populations. With others [58, 59] providing support for significant increases in levels of anxiety in rheumatic as well as other chronic pain conditions, this suggests that anxiety may be a primary and somewhat overlooked concern in arthritis populations. Our study is the first to highlight the specific association between anxiety and arthritis extending beyond a relationship with pain perception in a national sample of ageing women.

Interestingly, previous studies have linked the experience of both depression and anxiety in arthritis to the expression of pain and functional impairment, particularly in RA [57, 60]. Here, we were able to control for a number of possible confounding factors within the one model including perceptions of bodily pain and physical functioning (as measured by the SF-36). Our finding adds to the arthritis literature by highlighting the unique association between anxiety and arthritis in women. This may have particular implications for disease onset in arthritis. Von Korff and colleagues [61] noted in their longitudinal study that the experience of mental health problems (depression and anxiety) prior to age 21 was associated with an increased risk of developing adult-onset arthritis. Van't Land and colleagues [62] on the other hand found that while arthritis predicted the onset of psychiatric disturbance, a temporal

relationship between the presence of a mood disorder and arthritis onset did not exist. Although the findings provide support for increased attention on the anxiety-arthritis relationship, the role of anxiety as a predictor of arthritis onset would have to be examined via longitudinal analyses.

Perceived stress was found to have the strongest relationship with arthritis status at a univariate level, with the odds of reporting arthritis incrementally increasing for women experiencing either minimal or moderate/high levels of stress. While these women also reported experiencing more negative life events within the previous three years, it appears that the chronic perception of these events as stressful in the face of a perceived lack of personal coping resources may be important to the stress-arthritis paradigm. Studies have shown that chronically appraising a situation as harmful may initiate a cascade of physiological reactions which weakens the response of key allostatic systems (notably immune and neuroendocrine) [63, 64]. Particularly within this highly integrated process, it is posited that dysregulation of the hypothalamic-pituitary-adrenal axis through chronic glucocorticoid release or blunting is key in instigating a negative feedback loop to the immune system, thereby increasing susceptibility to chronic disease [65]. Likewise, long-term activation of the HPA axis has been hypothesised to hamper defence mechanisms in the hippocampus [66]. This may affect the ability to employ effective coping mechanisms in order to reduce the negative impact of stress. In this study, women diagnosed/treated for a psychiatric disorder were also twice as likely as women without mental health problems to report arthritis. Taken together, the univariate and multivariate analyses suggest that chronic stress perception may affect health via mood pathways. Chronic stress appraisal and anxiety may also play a contributory role in arthritis risk, however this intricate interactional process would have to be confirmed via longitudinal analyses.

The current study must be considered in light of a few limitations. Firstly, this study relied upon a self-report measure of arthritis. The prevalence of arthritis within this sample of women was found to be similar to point prevalence rates reported previously [5, 67, 68], particularly those using a similar definition of arthritis. Our results however are conservative compared to other Australian studies relying on self-report. Age-stratified prevalence rates for women 55-64 years using data from the 2007-2008 National Health Survey have been reported in excess of 40% [1]. In their study, a broader definition of arthritis diagnosis was considered and prevalence rates included all arthropathies. Despite this, March and colleagues [69], have found that self-reported physician diagnosed general arthritis has good congruency with clinically derived diagnoses. We also did not have information regarding time since arthritis diagnosis. This may have impacted upon the study findings as women may report different psychosocial responses at certain stages of the disease process. Studies focused on RA however, have reported no statistical difference in psychological well-being between patients with early as opposed to established disease [70, 71].

With life expectancies increasing, addressing the burden associated with arthritis has become a key priority for governmental policy makers. The findings of this large national cohort study add to our current understanding of this burden and highlight the important role of psychosocial factors in this process, particularly for women as they transition from midlife to older age. While further prospective research is required in order to elucidate the specific pathways by which stress and psychosocial factors contribute to the long-term impact of arthritis on women, our findings provide greater insight into the relationship between chronic stress perception and anxiety. In particular, being able to control for factors that confound the arthritis experience (e.g. bodily pain, physical functioning and obesity) we were able to demonstrate that the experience of anxiety extends beyond a direct connection with pain expression. As the experience of anxiety has the potential to adversely influence treatment

outcome, research focused on understanding the complexities surrounding the relationship between anxiety and arthritis has the potential to inform the development of targeted interventions aimed at addressing the psychosocial needs of women, thereby reducing the deleterious health effects associated with arthritis. In doing so, this will not only reduce the economic burden associated with the disease, but will also facilitate women in ageing well.

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Competing Interest Statement

The authors have no competing interests to report.

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Table 1. Sociodemographic characteristics of women from the 1946-1951 cohort according to arthritis diagnosis^a.

	Missing	No arthritis	Arthritis
	n (%)	n (%)	n (%)
Age^b			
Mean (SD)		58.5 (1.5)	58.6 (1.5)
<i>Missing</i>	2 (0.0%)		
Marital status			
Married/de facto		5689 (77.7%)	2276 (75.8%)
Separated/divorced/widowed		1416 (19.3%)	611 (20.3%)
Never married		220 (3.0%)	116 (3.9%)
<i>Missing</i>	83 (0.8%)		
Area of residence			
Urban		4992 (68.6%)	2012 (67.2%)
Rural/remote		2289 (31.4%)	981 (32.8%)
<i>Missing</i>	137 (1.3%)		
Educational attainment			
Tertiary/post graduate		1382 (18.9%)	448 (14.9%)
Trade/diploma		1553 (21.2%)	580 (19.3%)
School/higher school certificate		3416 (46.6%)	1383 (46.1%)
No formal education		976 (13.3%)	587 (19.6%)
<i>Missing</i>	86 (0.8%)		

^a weighted for area

^b for continuous variables, means and standard deviations are reported

Table 2. Unadjusted and adjusted odds ratios with 95% confidence intervals (CI) for psychosocial factors associated with arthritis diagnosis for women born between 1946 and 1951.

	Missing n (%)	No arthritis n (%)	Arthritis n (%)	^a Unadjusted odds ratio (95% CI)	P value	^a Adjusted odds ratio (95% CI)	P value
Perceived stress							
None [ref]		721 (9.8%)	177 (5.9%)	-----	-----		
Minimal		5823 (79.2%)	2329 (77.2%)	1.6 (1.4, 1.9)	<0.001		
Moderate/high		812 (11.0%)	512 (17.0%)	2.6 (2.1, 3.1)	<0.001		
Missing	37 (0.4%)						
Negative life events experienced within the past 12 months							
Death of a family member/close friend							
No [ref]		5833 (79.2%)	2320 (76.9%)	-----	-----		
Yes		1534 (20.8%)	698 (23.1%)	1.1 (1.0, 1.3)	0.009		
Missing	26 (0.2%)						
Major illness of family member/close friend							
No [ref]		5024 (68.2%)	1824 (60.4%)	-----	-----	-----	-----
Yes		2343 (31.8%)	1195 (39.6%)	1.4 (1.3, 1.5)	<0.001	1.1 (1.0, 1.2)	0.055
Missing	25 (0.2%)						
Interpersonal/relationship difficulties							
No [ref]		6553 (89.0%)	2570 (85.2%)	-----	-----		
Yes		814 (11.0%)	448 (14.8%)	1.4 (1.2, 1.6)	<0.001		
Missing	26 (0.2%)						
Financial strain							
No [ref]		6119 (83.1%)	2435 (80.7%)	-----	-----		
Yes		1248 (16.9%)	584 (19.3%)	1.2 (1.1, 1.3)	0.004		
Missing	25 (0.2%)						
Psychiatric diagnoses							
Depression							
No [ref]		6629 (89.8%)	2448 (80.9%)	-----	-----		

Yes		757 (10.2%)	577 (19.1%)	2.1 (1.8, 2.3)	<0.001		
Missing	0 (0.0%)						
Anxiety/nervous disorder							
No [ref]		6826 (92.4%)	2578 (85.2%)	-----	-----	-----	-----
Yes		560 (7.6%)	447 (14.8%)	2.1 (1.9, 2.4)	<0.001	1.5 (1.2, 1.7)	<0.001
Missing	0 (0.0%)						
Perceived social support							
All of the time [ref]		4076 (55.7%)	1443 (48.0%)	-----	-----	-----	-----
Most of the time		1966 (26.9%)	884 (29.4%)	1.3 (1.2, 1.4)	<0.001	1.2 (1.0, 1.3)	0.011
Some of the time		879 (12.0%)	471 (15.7%)	1.5 (1.3, 1.7)	<0.001	1.2 (1.0, 1.5)	0.013
None/little of the time		391 (5.3%)	209 (7.0%)	1.5 (1.3, 1.8)	<0.001	1.0 (0.8, 1.3)	0.845
Missing	92 (0.9%)						
Life approach^b							
Mean (SD)		16.58 (4.00)	15.22 (4.35)	0.93 (0.92, 0.93)	<0.001	0.99 (0.98, 1.01)	0.239
Missing	107 (1.0%)						

^a weighted for area

^b for continuous variables, means and standard deviations are reported

^c covariates remaining in the final multivariate model: SF-36 (**physical functioning**, **bodily pain**, **general health**, mental health, **social functioning**, emotional and physical role limitations); demographics (area of residence, **age**, marital status, and educational attainment); health behaviours (**BMI**, smoking and alcohol use); menopause status; **hormone replacement therapy use**. Covariates significantly contributing to the relationship with arthritis are bolded. Note: for BMI only the highest BMI category (obese) was significantly related to arthritis.