Osteoarthritis and Cartilage

OARSI OSTEOARTHRITIS RESEARCH SOCIETY INTERNATIONAL

The substantial personal burden experienced by younger people with hip or knee osteoarthritis

I.N. Ackerman † *, A. Bucknill ‡, R.S. Page §, N.S. Broughton ‖, C. Roberts ‡, B. Cavka ‡, P. Schoch ¶, C.A. Brand ‡

† The University of Melbourne and Melbourne Health, Melbourne, Australia
‡ Melbourne Health, Melbourne, Australia
§ University Hospital Geelong and Deakin University, Geelong, Australia
‖ Peninsula Health, Frankston, Australia
¶ University Hospital Geelong, Geelong, Australia

ARTICLE INFO

SUMMARY

Objective: To compare Health-Related Quality of Life (HRQoL) and psychological distress in younger people with hip or knee osteoarthritis (OA) to age- and sex-matched population norms, and evaluate work limitations in this group.

Method: People aged 20—55 years with hip or knee OA were recruited from major hospitals ($n = 126$) and community advertisements ($n = 21$). HRQoL was assessed using the Assessment of Quality of Life (AQoL) instrument (minimal important difference 0.06 AQoL units) and compared to population norms. Psychological distress was assessed using the Kessler Psychological Distress Scale (K10) and the prevalence of high/very high distress (K10 score $\geq$22) was compared to Australian population data. Work limitations were evaluated using the Workplace Activity Limitations Scale (WALS).

Results: Considering most participants had a relatively recent OA diagnosis (<5 years), the extent of HRQoL impairment was unexpected. A very large reduction in HRQoL was evident for the overall sample, compared with population norms (mean difference −0.35 AQoL units, 95% CI −0.40 to −0.31). Females, people aged 40—49 years, and those with hip OA reported average HRQoL impairment of almost 40% (mean reductions −0.38 to −0.39 AQoL units). The overall prevalence of high/very high distress was 4 times higher than for the population (relative risk 4.19, 95% CI 3.53—4.98) and 67% reported moderate to considerable OA-related work disability, according to WALS scores.

Conclusions: These results clearly demonstrate the substantial personal burden experienced by younger people with hip or knee OA, and support the provision of targeted services to improve HRQoL and maximise work participation in this group.

Introduction

According to the landmark 2010 Global Burden of Disease Study, hip and knee osteoarthritis (OA) represent a substantial cause of disability worldwide and are responsible for approximately 17 million years lived with disability globally[1]. While hip and knee OA are traditionally associated with older age, it is increasingly recognised that younger people are also affected by these conditions[2,3], often related to sporting injuries, road accidents, or congenital conditions. In the most recent Australian Health Survey, more than half of the 1.8 million Australians with OA were aged between 25 and 64 years[4]. In Australia, 13% of primary total hip replacements and 7% of primary total knee replacements are undertaken in people aged less than 55 years[5]. People aged less than 55 years also represent approximately one-third of people with arthritis who sought care from medical and other health professionals within the previous 12 months[6]. While direct healthcare

* Address correspondence and reprint requests to: I.N. Ackerman, Melbourne EpiCentre, Department of Medicine (Royal Melbourne Hospital), The University of Melbourne, Parkville Victoria 3050, Australia. Tel: 61-3-9342-2153; Fax: 61-3-9342-8780.

E-mail addresses: i.ackerman@unimelb.edu.au (I.N. Ackerman), Andrew.Bucknill@mh.org.au (A. Bucknill), richardpage@geelongortho.com.au (R.S. Page), nigel.s.broughton@gmail.com (N.S. Broughton), Carol.Roberts@mh.org.au (C. Roberts), Bernarda.Cavka@mh.org.au (B. Cavka), PETERSC@BarwonHealth.org.au (P. Schoch), caroline.brand@monash.edu (C.A. Brand).

expenditure for OA among people of working age is substantial[7], the work-related impacts are even more costly. The costs of retiring early in Australia due to arthritis include over $9 billion in lost gross domestic product[8] and additional societal costs are associated with reduced work productivity[9].

As most research into the burden of OA has focused on older individuals, comparatively little is known about the experience of younger adults with OA. Clinical and population-based studies involving mainly older adults have shown that hip and knee OA can significantly affect quality of life[10–14] and psychological well-being[15,16]. However, the impact of these conditions on younger adults has not been specifically quantified. There is perhaps even greater potential for impaired Health-Related Quality of Life (HRQoL) among people of working age given the distinct set of life responsibilities faced by this group, including parenting roles and work commitments. Earlier research has identified arthritis-related work limitations among people aged 18–65 years; however, data pertaining specifically to the hip or knee joints are scarce[17] and some studies have included conditions other than OA[18]. Further research is needed to improve our understanding of the personal burden borne by younger people with hip or knee OA, in terms of psychosocial wellbeing and capacity to participate in paid and unpaid employment. These data could inform the development of healthcare programs and support services that target the needs of this group.

The overall objective of this study was to investigate wellbeing (HRQoL, psychological distress and health status) and work participation in younger people with hip or knee OA. The specific aims were:

1 to compare the HRQoL of people aged 20–55 years who have hip and/or knee OA with age- and sex-matched Australian norms;
2 to compare the prevalence of high/very high psychological distress in the sample with age- and sex-matched norms; and
3 to evaluate health status and work limitations in this group.

Methods

Study design

A multi-centre, cross-sectional study design was used.

Participants and recruitment

As the study protocol has previously been published[19], an overview of the study procedures is presented here. Ethics approval was obtained from the Melbourne Health, Barwon Health and Peninsula Health Human Research Ethics Committees. To be eligible, individuals were required to be aged 20–55 years, have a diagnosis of hip and/or knee OA (based on radiological reports, doctor's report or doctor's referral), and be fluent in English or have a proxy to assist with questionnaire completion. Exclusion criteria included concomitant inflammatory arthritis and overt cognitive dysfunction.

Participants were recruited in 2013 from the orthopaedic outpatient and Osteoarthritis Hip and Knee Service clinics at three major public hospitals in Victoria, Australia (a large metropolitan tertiary public hospital, a smaller metropolitan tertiary public hospital, and a regional tertiary public hospital). Referral to these clinics was made by the patient's general practitioner. In Australia, OA care is commonly managed in primary care settings by general practitioners, with referral made to orthopaedic surgeons for assessment and consideration of surgery when conservative management options are no longer adequate or at the patient's request.

Clinic lists and referrals at each hospital were screened weekly to identify potentially eligible individuals. A telephone screening process was used to confirm eligibility. A community-based sample was recruited through public advertisements[19], with interested individuals screened for eligibility. All participants completed a consent form and study questionnaire.

Outcome measures

Data on educational attainment, marital status, paid and unpaid employment, height, weight, time since OA diagnosis, and doctor-diagnosed co-morbidities (asthma, diabetes, hypertension, increased cholesterol, coronary artery disease and anxiety/depression) were collected in the study questionnaire.

A number of validated instruments were also administered. HRQoL was assessed using the Assessment of Quality of Life (AQoL) instrument. This generic measure has been previously used in arthritis research and its psychometric properties have been evaluated[20,21]. The 12-item AQoL-4D covers independent living, relationships, mental health and senses and produces a utility score ranging from −0.04 (worst HRQoL) to 1.00 (full HRQoL).

Psychological distress was assessed using the Kessler Psychological Distress Scale (K10)[22]. This contains 10 questions relating to anxiety, depression and worry and produces a score ranging from 10 (lowest psychological distress) to 50 (highest distress). High K10 scores indicating high psychological distress are strong predictors of depression and anxiety[23]. K10 scores were categorised into levels of psychological distress according to 2011–2012 Australian Health Survey definitions[4]: K10 scores <16 indicate low distress, 16–21 indicate moderate distress, 22–29 indicate high distress, and ≥30 represents very high distress.

Health status was evaluated using the disease-specific Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index. Its validity and reliability have been extensively demonstrated[24]. The WOMAC Index consists of 24 items (5 pain, 2 stiffness and 17 physical function items) and produces a total score transformed to a 0 (best health) to 100 (worst health) scale. The total score was also used to categorise OA severity, similar to previous methods; a WOMAC score <7 was considered asymptomatic joint disease, a score of 7–38 was considered mild-moderate disease and ≥39 indicated severe joint disease[14,25].

Work limitations were assessed using the Workplace Activity Limitations Scale (WALS). This 12-item tool was developed to measure arthritis-related work limitations[26] and includes response options for difficulty unrelated to arthritis and for tasks unrelated to the individual's job. WALS scores range from 0 (no workplace activity limitations) to 36 (greatest workplace limitations). Scores between 0 and 4 indicate little or no difficulty, 5–8 indicate moderate work disability and scores ≥9 represent considerable workplace difficulty[27]. The instrument's psychometric properties have been reported[28].

Statistical analysis

Data analysis was undertaken using Stata v12.1 (StataCorp, Texas, USA) and SPSS Statistics 22 (IBM, New York, USA). BMI was calculated using self-reported height and weight data and classified into underweight/normal weight (BMI ≤24.99 kg/m^2), overweight (BMI 25–29.99) and obese categories (BMI ≥30)[29]. Demographic, co-morbidity and employment data were analysed descriptively. Differences in demographic and disease characteristics between hospital and community participants were evaluated using chi-square and two-sample t-tests.

AQoL data were compared to age- and gender-matched Australian population norms[30] using two-sample t-tests. As the

overall population norm was based on data from people aged 15−80 years and over, we calculated a weighted mean for the population aged 20−59 years using published AQoL means and sample sizes for the 20−29, 30−39, 40−49 and 50−59 age groups. This process was also used to generate mean AQoL population norms for males and females aged 20−59. For each *t*-test, the largest population standard deviation within these age strata was used. Although Bonferroni adjustments for multiple comparisons were planned[19], these were not required as each analysis produced very small *P*-values (range 0.000−0.004). K10 data were compared to age- and gender-matched data for the population aged 18−54 years from the 2011−12 Australian Health Survey[4], and an online calculator[31] was used to estimate relative risk for the presence of high/very high psychological distress (K10 score ≥22) in the sample, compared with the population.

Univariate associations between demographic factors and HRQoL, psychological distress, health status and work limitations were evaluated using two-sample *t*-tests or analysis of variance, with log-transformed K10 data used to approximate a normal distribution. Analysis of covariance was not used to explore outcomes according to WOMAC-defined OA severity[19] as only 1 participant was classified as having asymptomatic OA. Instead, two-sample *t*-tests were used to compare mild-moderate OA and severe OA. Multiple linear regression was used to determine significant predictors of HRQoL, distress, health status and work limitations, with separate models generated for each outcome. Predictor variables were selected from the univariate analyses (using a *P*-value of 0.20 as a conservative threshold for inclusion) with manual backwards stepwise techniques used to identify variables that were significantly associated with each outcome.

Results

Participant characteristics

Fig. 1 provides an overview of participant screening and recruitment. Data were available for analysis from 147 participants (*n* = 126 from hospitals, *n* = 21 from the community). Recruitment was ceased before reaching the target sample size of 175[19] after preliminary analyses showed a larger than expected reduction in HRQoL, compared to population norms. As the magnitude of HRQoL impairment was approximately 5 times greater than estimated for our sample size calculations, it was clear the study had sufficient statistical power to achieve its primary aim.

The participant characteristics are summarised in Table I. The mean (SD) age of participants was 48 (6) years (range 24−55 years) and 63% were female. The average age of community participants and hospital participants was similar (mean 47 vs 49 years, *P* = 0.26), although there was a higher proportion of females among the community participants (86% vs 60%, *P* = 0.02). Fifty-nine per cent of the sample had been diagnosed with knee OA, 37% had hip OA, and 4% had hip and knee OA. The majority (91%) had a radiographic diagnosis of OA (from X-ray/CT/MRI). Overall, most participants had been diagnosed with OA within the previous 5 years (73%); hospital participants were more likely to have a recent diagnosis (47% diagnosed within previous 12 months vs 24% for community participants, *P* = 0.02). Use of specialist orthopaedic services was not limited to hospital participants; 43% of community participants had consulted an orthopaedic surgeon for their hip or knee OA within the previous 12 months (compared to 33% of hospital participants, *P* = 0.36). Few participants had consulted a rheumatologist for their OA within the previous 12 months (2% for hospital participants vs 5% for community participants, *P* = 0.54). Most participants were classified as overweight or obese (22% and 49%, respectively). The most common doctor-diagnosed co-

morbidities were anxiety or depression (28%) and hypertension (23%), while 18% reported increased cholesterol, 17% had asthma, 8% had diabetes and 2% had coronary artery disease.

Sixty-six per cent of the sample was in paid employment and these individuals worked, on average, 38 hours per week (interquartile range 24−40 hours). Sixteen per cent of participants reported they had ceased paid employment because of their hip or knee OA. Almost one-quarter (24%) were unable to do any unpaid work due to their hip or knee.

HRQoL

The extent of HRQoL impairment among the sample was unexpectedly high. The mean (SD) AQoL score was 0.50 (0.27), indicating only moderate HRQoL. As shown in Table II, the overall sample had a large and clinically important reduction in HRQoL, compared with Australian population norms (mean difference −0.35 AQoL units, 95% CI −0.40 to −0.31; minimal important difference = 0.06 AQoL units[30]). Compared with sex-matched norms (Fig. 2), both sexes reported very large reductions in HRQoL (mean difference −0.39, 95% CI −0.45 to −0.33 for females; mean difference −0.29, 95% CI −0.36 to −0.22 for males). While all age groups demonstrated significant HRQoL impairment, the 40-49 age group demonstrated an almost 40% average reduction in HRQoL scores compared with age-matched norms (mean difference −0.38, 95% CI −0.45 to −0.31). A clear reduction in HRQoL was evident for hip OA (mean difference −0.38, 95% CI −0.45 to −0.31) and knee OA (mean difference −0.32, 95% CI −0.38 to −0.26).

Psychological distress

The mean (SD) K10 score for the sample was 22.2 (8.9). Twenty-eight per cent of the sample (*n* = 41) was classified as having low psychological distress and 24% (*n* = 35) was classified as having moderate distress. The prevalence of high psychological distress among the sample was substantially greater than for the general population aged 18−54 years (31% vs 8%), as was the prevalence of very high distress (16% vs 4%). Sensitivity analyses excluding the 41 participants who had been diagnosed with anxiety or depression showed that the prevalence of high distress (31%) and very high distress (8%) among the study sample remained higher than for the population.

To put these prevalence data in context, study participants were over 4 times more likely to have high or very high psychological distress, compared with the Australian population aged 18−54 years (relative risk 4.19, 95% CI 3.53−4.98). Sex-specific analyses showed that both sexes had a significantly higher likelihood of reporting high/very high distress, compared with their population counterparts (relative risk for males 4.49, 95% CI 3.25−6.19; relative risk for females 3.80, 95% CI 3.10−4.64).

Health status

WOMAC scores showed that participants reported, on average, high levels of pain (mean WOMAC pain score 53.7, SD 20.7) and stiffness (mean WOMAC stiffness score 56.3, SD 25.4) and reduced function (mean WOMAC function score 51.4, SD 23.3). The mean (SD) total WOMAC score was 52.3 (21.9). Using the total WOMAC score to classify OA severity, only 1 participant (<1%) was considered to have asymptomatic OA, while 27% were classified as having mild to moderate OA and 71% were classified as having severe OA. There was a difference in WOMAC-defined OA severity between participants recruited from hospital settings and those recruited from the community; 78% of hospital participants had severe OA, compared to 33% of community participants (*P* < 0.01).
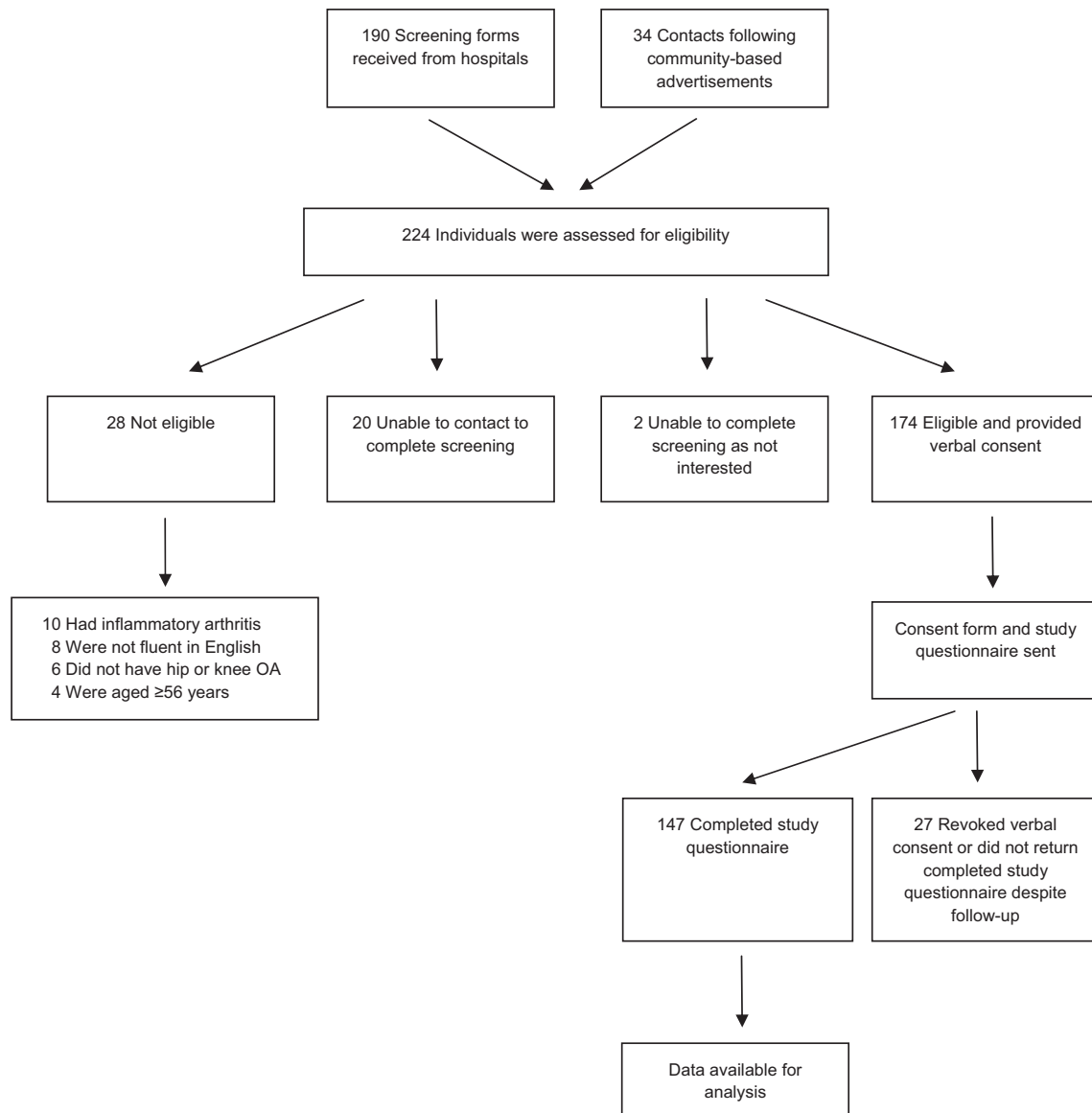
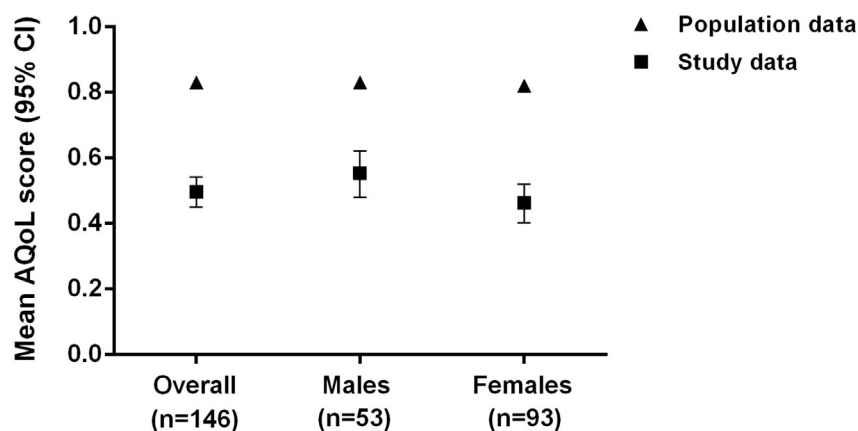**Fig. 1.** Overview of participant screening and recruitment.

Fig. 2. HRQoL according to gender. AQoL: Assessment of Quality of Life instrument; range −0.04 − 1.00, scored worst to best. Population norms were calculated from published data for the population aged 20−59 years, for males aged 20−59 years and for females aged 20−59 years[30]; 95% CIs for the population norms are contained within the black triangles.

Table I
Characteristics of study participants

Characteristic	Participants ($n = 147^*$)
Age group, n (%)	
20–29 years	3 (2)
30–39 years	14 (10)
40–49 years	54 (37)
50–55 years	76 (52)
Female, n (%)	93 (63)
Diagnosis, n (%)	
Knee osteoarthritis	87 (59)
Hip osteoarthritis	54 (37)
Knee and hip osteoarthritis	6 (4)
Time since osteoarthritis diagnosis, n (%)	
Within previous 12 months	64 (44)
1–5 years ago	43 (29)
>5 years ago	40 (27)
Osteoarthritis severity, n (%)	
Asymptomatic (WOMAC <7)	1 (<1)
Mild to moderate (WOMAC 7–38)	40 (27)
Severe (WOMAC ≥39)	105 (71)
Body Mass Index category, n (%)	
Underweight or normal weight	39 (27)
Overweight	32 (22)
Obese	72 (49)
Marital status, n (%)	
Married/*de facto* relationship	77 (52)
Single/widowed/divorced	70 (48)
Education, n (%)	
Primary school or less	3 (2)
High school	78 (53)
Trade or technical education	41 (28)
University	24 (16)
Paid work participation, n (%)	
Currently in paid work	97 (66)
Stopped work due to hip or knee osteoarthritis	24 (16)
Not in paid work due to parenting responsibilities	7 (5)
Unemployed	17 (12)
Retired	1 (<1)
Unpaid work participation, n (%)	
Does unpaid work	15 (10)
Unable due to hip or knee osteoarthritis	35 (24)
Unable for other reasons	95 (65)

* Responses may not total 147 due to missing responses for some variables.

Work limitations

A high mean WALS score was reported for the sample (mean 9.6, SD 6.3), with scores ranging from 0 to 32. Many participants experienced substantial work limitations due to their hip or knee OA (Fig. 3). Overall, 44% of participants reported considerable workplace difficulty, 23% had moderate work disability and 18%

experienced little or no difficulty with work-related tasks. WALS data were not available for 21 participants (14%); all except 1 of whom were not in paid employment and therefore these items were not relevant to their situation.

Factors associated with wellbeing and work limitations

Table III summarises the factors associated with HRQoL, psychological distress, health status and work limitations on univariate analysis. Participants recruited from hospital settings had significantly poorer health status scores, compared to those from the community (mean WOMAC difference 20.10, 95% CI 10.41–29.80). While there was a considerable difference in mean AQoL scores between the hospital and community participants (approximately 0.10 AQoL units, as shown in Table III), this was not statistically significant. The mean AQoL score reported by the community participants was approximately 0.27 AQoL units below the population norm, indicating that this subgroup also experienced substantial HRQoL impairment. Mean K10 and WALS scores were similar for the hospital and community participants ($P = 0.22$ and $P = 0.36$, respectively). Sex, age group, BMI category, diagnosis (hip vs knee OA) and time since diagnosis were not associated with HRQoL, psychological distress, health status or work limitations. Additional analyses comparing participants aged less than 50 years ($n = 71$) and those aged 50 years and over ($n = 76$) showed no differences in HRQoL ($P = 0.86$), psychological distress ($P = 0.75$), health status ($P = 0.91$), or work limitations ($P = 0.77$) between these subgroups.

Level of education was strongly associated with HRQoL, distress and health status. Compared to participants who had completed higher education, those who had only completed primary or high school reported lower HRQoL (mean AQoL difference −0.11, 95% CI −0.20 to −0.02), higher distress (mean log-transformed K10 difference 0.16, 95% CI 0.03–0.29) and poorer health status (mean WOMAC difference 14.54, 95% CI 7.67–21.42). Compared to mild-moderate OA, severe OA was associated with poorer HRQoL (mean AQoL difference −0.31, 95% CI −0.39 to −0.24), higher distress (mean log-transformed K10 difference 0.37, 95% CI 0.24–0.50) and greater work limitations (mean WALS difference 7.11, 95% CI 5.48–8.73).

Multivariate analyses incorporating participant and disease characteristics showed that WOMAC-defined OA severity was the only variable significantly associated with HRQoL, psychological distress, and work limitations. Severe OA remained associated with lower HRQoL (beta coefficient −0.32, 95% CI −0.40 to −0.23), higher distress (beta coefficient 0.37, 95% CI 0.24 to 0.50 for log-

Table II
Comparison of HRQoL scores with population norms

Group	Sample		Population		Mean difference (95% CI)	P
	n	Mean AQOL (SD)	n	Mean AQoL (SD)		
Overall sample	146	0.50 (0.27)	2029	0.85 (0.22)	−0.35 (−0.40 to −0.31)	<0.001
Sex						
Females	93	0.46 (0.28)	1014	0.85 (0.23)	−0.39 (−0.45 to −0.33)	<0.001
Males	53	0.55 (0.25)	1014	0.84 (0.22)	−0.29 (−0.36 to −0.22)	<0.001
Age group*						
30–39 years	14	0.59 (0.28)	578	0.85 (0.20)	−0.26 (−0.42 to −0.10)	<0.01
40–49 years	53	0.47 (0.26)	540	0.85 (0.18)	−0.38 (−0.45 to −0.31)	<0.001
50–55 years	76	0.50 (0.27)	378	0.80 (0.22)	−0.30 (−0.37 to −0.24)	<0.001
Diagnosis†						
Hip OA	54	0.46 (0.26)	2029	0.85 (0.22)	−0.38 (−0.45 to −0.31)	<0.001
Knee OA	86	0.52 (0.27)	2029	0.85 (0.22)	−0.32 (−0.38 to −0.26)	<0.001

Australian population norms calculated from published data[30].
* Data are not presented for the 20–29 year age group due to the small sample size ($n = 3$).
† Data are not presented for the hip and knee OA group (diagnosis of both conditions) due to the small sample size ($n = 6$).
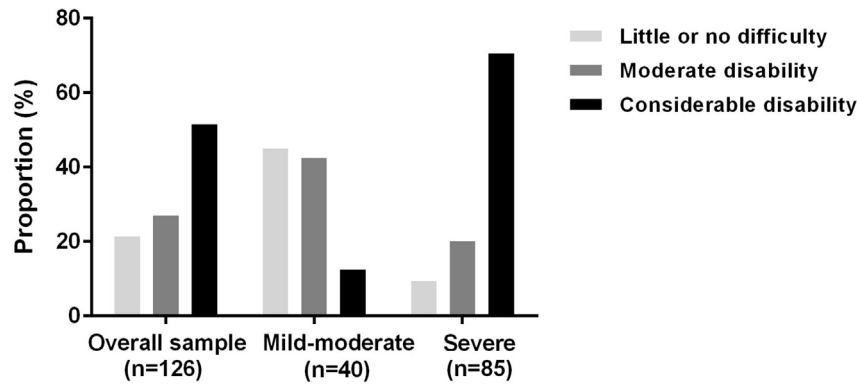
Fig. 3. Proportion of people experiencing work limitations by WOMAC-defined osteoarthritis severity WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; WOMAC score 7–38 indicates mild-moderate OA, and score ≥39 indicates severe OA. Classification of work limitations: Workplace Activity Limitations Scale (WALS) score of 0–4 indicates little or no difficulty, score of 5–8 indicates moderate disability and score ≥9 indicates considerable disability.

transformed K10 scores) and greater work limitations (beta coefficient 7.11, 95% CI 5.08–9.14). Recruitment source (beta coefficient −14.45, 95% CI −24.70 to −4.20) and education (beta coefficient −10.68, 95% CI −17.93 to −3.43) both remained significantly associated with health status in the multivariate model. Participants recruited from hospitals and those with only primary/high school education had the poorest health status.

Discussion

This study highlights the significant personal burden of hip and knee OA among people aged 20–55 years, which was characterised by large reductions in HRQoL, high levels of psychological distress and substantial work limitations. The magnitude of impairment is particularly striking given the relatively recent diagnosis of OA for most participants. Females and people aged 40–49 years reported an almost 40% average reduction in HRQoL scores and this may reflect the interplay between OA symptoms and multiple career, family and financial responsibilities. OA severity (as defined by WOMAC cut-off scores) was the only factor consistently associated with HRQoL, psychological distress and work limitations on multivariate analysis and while intuitive, this indicates there may be opportunities for earlier intervention to limit the personal impact of OA.

Table III
Factors associated with HRQoL, distress and work limitations on univariate analysis

Characteristic	AQoL mean (SD)	P	K10 mean (SD)	P*	WOMAC mean (SD)	P	WALS mean (SD)	P
Recruitment source		0.11		0.22		<0.01		0.36
Hospital (n = 126)	0.48 (0.27)		22.62 (9.08)		55.20 (21.04)		9.81 (6.38)	
Community (n = 21)	0.58 (0.27)		19.86 (7.22)		35.10 (19.22)		8.43 (5.95)	
Sex		0.05		0.25		0.09		0.44
Females (n = 93)	0.46 (0.28)		22.87 (9.04)		54.63 (22.46)		9.23 (6.72)	
Males (n = 54)	0.55 (0.25)		21.09 (8.51)		48.25 (20.47)		10.12 (5.65)	
Age group		0.52		0.33		0.92		0.64
20–39 years (n = 17)	0.56 (0.31)		26.00 (11.81)		50.65 (27.66)		8.13 (6.90)	
40–49 years (n = 54)	0.47 (0.26)		21.48 (8.20)		53.14 (22.53)		9.84 (6.72)	
50–55 years (n = 76)	0.50 (0.27)		21.88 (8.46)		52.11 (20.28)		9.73 (5.95)	
Education		0.01		0.02		<0.01		0.70
Primary or high school (n = 81)	0.44 (0.27)		23.85 (9.34)		58.86 (21.25)		9.80 (6.69)	
Trade, technical or university (n = 65)	0.56 (0.26)		20.25 (7.84)		44.31 (20.27)		9.36 (5.96)	
Marital status		0.19		0.07		0.18		0.74
Married/de facto relationship (n = 77)	0.52 (0.24)		20.61 (7.03)		50.01 (21.78)		9.75 (6.54)	
Single/widowed/divorced (n = 70)	0.46 (0.30)		24.04 (10.31)		54.89 (21.92)		9.37 (6.06)	
Body Mass Index		0.43		0.15		0.09		0.27
Underweight or normal weight (n = 39)	0.52 (0.28)		21.45 (8.44)		45.71 (23.57)		8.15 (5.89)	
Overweight (n = 32)	0.53 (0.27)		19.59 (7.57)		51.40 (20.90)		10.50 (6.04)	
Obese (n = 72)	0.47 (0.27)		22.99 (8.75)		55.29 (20.66)		10.05 (6.60)	
Diagnosis		0.20		0.74		0.09		0.10
Hip OA (n = 54)	0.46 (0.26)		21.19 (7.22)		56.19 (20.56)		10.50 (6.97)	
Knee OA (n = 87)	0.52 (0.27)		22.30 (9.65)		49.66 (22.68)		8.59 (5.63)	
Osteoarthritis severity		<0.01		<0.01		N/A		<0.01
Mild or moderate (WOMAC 7–38) (n = 40)	0.72 (0.17)		16.73 (5.76)		N/A†		4.83 (3.07)	
Severe (WOMAC ≥39) (n = 105)	0.41 (0.25)		24.54 (8.89)		N/A†		11.93 (6.12)	
Time since diagnosis		0.44		0.19		0.71		0.27
<12 months (n = 64)	0.52 (0.25)		21.19 (7.97)		51.32 (22.05)		9.54 (5.73)	
1–5 years (n = 43)	0.51 (0.29)		21.49 (8.47)		51.50 (20.60)		8.36 (6.50)	
>5 years (n = 40)	0.45 (0.29)		24.60 (10.27)		54.75 (23.36)		10.91 (7.07)	

AQoL: Assessment of Quality of Life instrument; range −0.04–1.00, scored worst to best; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; range 0–100, scored best to worst; K10: Kessler Psychological Distress scale; range 10–50, scored best to worst; WALS: Workplace Activity Limitations Scale; range 0–36, scored best to worst.
* P-values for the K10 analyses were obtained using log-transformed data; non-transformed means and standard deviations are presented for ease of interpretation.
† Analysis not undertaken as WOMAC scores were used to classify osteoarthritis severity.

The HRQoL and psychological distress data confirm that in addition to its physical manifestations, OA has a major psychosocial impact which was particularly evident for this younger age group. Almost half the sample (47%) reported high/very high psychological distress scores, and high/very high distress was over 4 times more prevalent when compared with the Australian population of a similar age. The high prevalence remained even after excluding participants who had been formally diagnosed with anxiety or depression. High levels of distress have also been reported in clinical studies of older people with OA[16] and those with severe disease awaiting joint replacement[15]. An Australian population-based study found that people with self-reported arthritis aged 35–54 years were more likely to have been diagnosed with mental health conditions than those without arthritis, and this group was at greater risk for psychological distress[32]. The observed psychological outcomes substantially augment the health burden of OA, with implications for the holistic management of this patient group. Interventions to detect and reduce psychological distress warrant consideration given the chronicity of OA; young people may need to self-manage the condition for many years before joint replacement surgery is deemed appropriate. Psychological health is also a known predictor of outcome following joint replacement surgery[33–35]. It is reasonable, therefore, that OA models of care for younger patients incorporate anxiety and depression screening, with appropriate referral and support mechanisms established. Pain coping skills training could also be included within multi-modal OA services and this can be effectively delivered by physiotherapists[36] and nurse practitioners[37].

This study captured two key aspects of capacity to work: OA-related departure from work, and work limitations as assessed by the WALS instrument. Sixteen per cent of participants reported ceasing work due to hip or knee OA while many reported high WALS scores, which are associated with greater need for assistance at work and negative job impacts including work interruptions, reduced hours and difficulty taking on extra responsibilities[27]. Services to support workers could also be integrated into current models of care, with a focus on managing OA-related functional restrictions, augmenting coping strategies, and facilitating health professional/employer communication[38,39]. Average WALS scores for this study were higher than for earlier Canadian research involving people recruited mostly from the community[27] but similar to pre-operative scores for people undergoing knee replacement[40], and this may reflect the disease severity of our sample. We also found nearly one-quarter of the sample could not undertake unpaid work (defined by participants to include charity, community, sporting club and household activities) because of their hip or knee, extending our limited understanding of unpaid/volunteer work participation in OA. A similar proportion of people aged 45 years and over (median age 62 years) reported arthritis as their main barrier to volunteering in the US[41] and our earlier research involving mainly older people (median age 66 years) found a strong relationship between unpaid work participation and severe hip or knee disease[14]. Inability to fully participate in paid employment and unpaid tasks may be a key contributor to financial and/or psychological distress and reduced HRQoL.

This study provides new information specific to people of working age. A key strength was the comprehensive assessment of psychosocial wellbeing using generic outcome measures that enabled comparisons with age- and gender-matched norms. The dual recruitment strategies produced a sample with a range of OA severity and diverse socioeconomic backgrounds, as indicated by the educational attainment data. We acknowledge that the community sub-group was relatively small and unlikely to be representative; however, as the study was designed to provide an overall snapshot of OA burden (rather than explore differences between recruitment settings) we do not consider this problematic. While a smaller proportion of community participants had severe OA (compared to those recruited from hospital settings), we note that both the community and hospital subgroups reported marked HRQoL impairment, higher levels of psychological distress, and OA-related work limitations (Table III). Taken together, these data indicate that both the hospital and community samples contributed to our findings. A key limitation is the cross-sectional design which meant that causal relationships could not be established. Data were not collected on the costs of reduced work participation and OA severity was classified using a self-reported measure and established cut-off scores.

There is considerable scope for further research involving this group. The establishment of longitudinal cohorts involving young people with OA will enable trajectories of HRQoL, psychological distress and work limitations to be evaluated over time, whilst tracking progression to joint replacement. The development and evaluation of new models of care for younger patients with OA is another key area, particularly in view of projected future demand for joint replacement in young people[3] and associated costs. The impact of OA on parenting tasks is also worthy of investigation. Several participants commented that OA had affected their ability to care for young children, as highlighted by the following note: "*It is strange there are no questions about parenting. I have small children – it (parenting) is the biggest impact that osteoarthritis has on my life, work is less so.*" This construct has been explored in inflammatory arthritis[42,43] but not OA.

In conclusion, these findings demonstrate that younger people with hip or knee OA experience a substantial personal burden. The results are worrying given the age of participants, recency of diagnosis and chronicity of OA. Opportunities exist to enhance current models of OA care and provide targeted services to improve psychosocial wellbeing and maximise work participation for people of working age.

Department, Peninsula Health) and Sally Beattie (Barwon Orthopaedic Research Unit, Barwon Health) for their support and assistance.

References

1. Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The global burden of hip and knee osteoarthritis: estimates from the global burden of disease 2010 study. Ann Rheum Dis 2014;73(7):1316–22.
2. Roos EM. Joint injury causes knee osteoarthritis in young adults. Curr Opin Rheumatol 2005;17(2):195–200.
3. Kurtz SM, Lau E, Ong K, Zhao K, Kelly M, Bozic KJ. Future young patient demand for primary and revision joint replacement: national projections from 2010 to 2030. Clin Orthop Relat Res 2009;467(10):2606–12.
4. Australian Bureau of Statistics. 4364.0.55.001-Australian Health Survey: First Results, 2011–12. Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4364.0.55.0012011-12?OpenDocument; (accessed 27 January 2015).
5. Annual reportAustralian Orthopaedic Association National Joint Replacement Registry. Adelaide: Australian Orthopaedic Association; 2013.
6. Australian Bureau of Statistics. 4364.0.55.002-Australian Health Survey: Health Service Usage and Health Related Actions, 2011–12. Available from: http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/E334D0A98272E4DCCA257B39000F2DCF?opendocument; (accessed 27 January 2015).
7. Australian Institute of Health and Welfare. Health Expenditure for Arthritis and Musculoskeletal Conditions, 2008–09. Canberra: Australian Institute of Health and Welfare; 2014.
8. Schofield D, Shrestha R, Percival R, Passey M, Callander E, Kelly S. The personal and national costs of lost labour force participation due to arthritis: an economic study. BMC Public Health 2013;13(1):188.
9. Arthritis and Osteoporosis Victoria. A Problem Worth Solving. Elsternwick: Arthritis and Osteoporosis Victoria; 2013.
10. Ethgen O, Vanparijs P, Delhalle S, Rosant S, Bruyere O, Reginster J-Y. Social support and health-related quality of life in hip and knee osteoarthritis. Qual Life Res 2004;13(2):321–30.
11. Salaffi F, Carotti M, Stancati A, Grassi W. Health-related quality of life in older adults with symptomatic hip and knee osteoarthritis: a comparison with matched healthy controls. Aging Clin Exp Res 2005;17(4):255–63.
12. Boutron I, Rannou F, Jardinaud-lopez M, Meric G, Revel M, Poiraudeau S. Disability and quality of life of patients with knee or hip osteoarthritis in the primary care setting and factors associated with general practitioners' indication for prosthetic replacement within 1 year. Osteoarthritis Cartilage 2008;16(9):1024–31.
13. Losina E, Walensky RP, Reichmann WM, Holt HL, Gerlovin H, Solomon DH, et al. Impact of obesity and knee osteoarthritis on morbidity and mortality in older Americans. Ann Intern Med 2011;154(4):217–26.
14. Ackerman IN, Ademi Z, Osborne RH, Liew D. Comparison of health-related quality of life, work status and health care utilization and costs according to hip and knee joint disease severity: results from a national Australian study. Phys Ther 2013;93(7):889–99.
15. Ackerman IN, Graves SE, Wicks IP, Bennell KL, Osborne RH. Severely compromised quality of life in women and those of lower socioeconomic status waiting for joint replacement surgery. Arthritis Care Res 2005;53(5):653–8.
16. Axford J, Butt A, Heron C, Hammond J, Morgan J, Alavi A, et al. Prevalence of anxiety and depression in osteoarthritis: use of the hospital anxiety and depression scale as a screening tool. Clin Rheumatol 2010;29(11):1277–83.
17. Bieleman HJ, Bierma-Zeinstra SMA, Oosterveld FGJ, Reneman MF, Verhagen AP, Groothoff JW. The effect of osteoarthritis of the hip or knee on work participation. J Rheumatol 2011;38(9):1835–43.
18. Theis KA, Murphy L, Hootman JM, Helmick CG, Yelin E. Prevalence and correlates of arthritis-attributable work limitation in the US population among persons ages 18–64: 2002 National Health Interview Survey Data. Arthritis Care Res 2007;57(3):355–63.
19. Ackerman IN, Page RS, Schoch P, Brand CA. Investigating wellbeing, work limitations and preferences for self-management education and peer support among younger people with hip and knee osteoarthritis: protocol for a cross-sectional study. BMJ Open 2013;3. e003030.
20. Busija L, Pausenberger E, Haines TP, Haymes S, Buchbinder R, Osborne RH. Adult measures of general health and health-related quality of life. Arthritis Care Res 2011;63(S11):S383–412.
21. Ackerman IN, Busija L, Tacey MA, Bohensky MA, Ademi Z, Brand CA, et al. Performance of the assessment of quality of life measure in people with hip and knee joint disease and implications for research and clinical use. Arthritis Care Res 2014;66(3):481–8.
22. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychol Med 2002;32(6):959–76.
23. Andrews G, Slade T. Interpreting scores on the Kessler psychological distress scale (K10). Aust N Z J Public Health 2001;25(6):494–7.
24. McConnell S, Kolopack P, Davis AM. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC): a review of its utility and measurement properties. Arthritis Care Res 2001;45(5):453–61.
25. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R, et al. Differences between men and women in the rate of use of hip and knee arthroplasty. N Engl J Med 2000;342(14):1016–22.
26. Gignac MAM, Sutton D, Badley EM. Arthritis symptoms, the work environment, and the future: measuring perceived job strain among employed persons with arthritis. Arthritis Care Res 2007;57(5):738–47.
27. Gignac MAM, Cao X, Tang K, Beaton DE. Examination of arthritis-related work place activity limitations and intermittent disability over four-and-a-half years and its relationship to job modifications and outcomes. Arthritis Care Res 2011;63(7):953–62.
28. Tang K, Beaton DE, Boonen A, Gignac MAM, Bombardier C. Measures of work disability and productivity: rheumatoid arthritis specific work productivity survey (WPS-RA), workplace activity limitations scale (WALS), work Instability scale for rheumatoid arthritis (RA-WIS), work limitations questionnaire (WLQ), and work productivity and activity impairment questionnaire (WPAI). Arthritis Care Res 2011;63(S11):S337–49.
29. World Health Organization. Obesity: Preventing and Managing the Global Epidemic. Geneva: World Health Organization; 2000.
30. Hawthorne G, Osborne R. Population norms and meaningful differences for the Assessment of Quality of Life (AQoL) measure. Aust N Z J Public Health 2005;29(2):136–42.

31. Herbert R. Confidence Interval Calculator. Available from: http://www.pedro.org.au/english/downloads/confidence-interval-calculator/; (accessed 27 January 2015).

32. Hill CL, Gill T, Taylor AW, Daly A, Dal Grande E, Adams RJ. Psychological factors and quality of life in arthritis: a population-based study. Clin Rheumatol 2007;26(7): 1049–54.

33. Ayers DC, Franklin PD, Ploutz-Snyder R, Boisvert CB. Total knee replacement outcome and coexisting physical and emotional illness. Clin Orthop 2005;440:157–61.

34. Lopez-Olivo MA, Landon GC, Siff SJ, Edelstein D, Pak C, Kallen MA, et al. Psychosocial determinants of outcomes in knee replacement. Ann Rheum Dis 2011;70(10):1775–81.

35. McHugh GA, Campbell M, Luker KA. Predictors of outcomes of recovery following total hip replacement surgery: a prospective study. Bone Joint Res 2013;2(11):248–54.

36. Hunt MA, Keefe FJ, Bryant C, Metcalf BR, Ahamed Y, Nicholas MK, et al. A physiotherapist-delivered, combined exercise and pain coping skills training intervention for individuals with knee osteoarthritis: a pilot study. Knee 2013;20(2):106–12.

37. Broderick JE, Keefe FJ, Bruckenthal P, Junghaenel DU, Schneider S, Schwartz JE, et al. Nurse practitioners can effectively deliver pain coping skills training to osteoarthritis patients with chronic pain: a randomized, controlled trial. Pain 2014;155(9):1743–54.

38. Gignac MA. Arthritis and employment: an examination of behavioral coping efforts to manage workplace activity limitations. Arthritis Rheum 2005;53(3):328–36.

39. Wilkie R, Phillipson C, Hay E, Pransky G. Frequency and predictors of premature work loss in primary care consulters for osteoarthritis: prospective cohort study. Rheumatology 2014;53(3):459–64.

40. Sankar A, Davis AM, Palaganas MP, Beaton DE, Badley EM, Gignac MA. Return to work and workplace activity limitations following total hip or knee replacement. Osteoarthritis Cartilage 2013;21(10):1485–93.

41. Theis KA, Murphy L, Hootman JM, Helmick CG, Sacks JJ. Arthritis restricts volunteer participation: prevalence and correlates of volunteer status among adults with arthritis. Arthritis Care Res 2010;62(7):907–16.

42. Barlow JH, Cullen LA, Foster NE, Harrison K, Wade M. Does arthritis influence perceived ability to fulfill a parenting role?: perceptions of mothers, fathers and grandparents. Patient Educ Couns 1999;37(2):141–51.

43. Katz PP, Pasch LA, Wong B. Development of an instrument to measure disability in parenting activity among women with rheumatoid arthritis. Arthritis Rheum 2003;48(4):935–43.