Does social support predict increased use of dental services in older men?

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ABSTRACT

Background: Past research on social support and dental visits in older people has been limited by cross-sectional design, limited social support dimensions and non-representative samples.
Methods: Data came from men with natural teeth completing Waves 3 and 4 of the Concord Health and Ageing in Men Project in Sydney, Australia. The relationship between social support at Wave 3 (2011–2012) and at least one dental visit per year at Wave 4 (2014–2016) was examined by Poisson regression. Social support was measured by structural (marital status, living arrangements, family support and social interaction) and functional (social support satisfaction) domains.
Results: About 673 men were analysed. Structural and functional social support were not associated with the pattern of usual dental visits 5 years later in univariable or multivariable analyses. The only consistent significant factor was income source, with older men who had other sources of income more likely to regularly visit the dentist than older men solely reliant on the pension for income (prevalence ratio: 1.31, 95% CI: 1.13–1.52).
Conclusions: We found no differences in the pattern of usual dental visits between older men with different levels and types of social support. For older Australian men, income source seems to be the most important determinant of regular dental visits. © 2022 Australian Dental Association

Keywords: Ageing, dental utilization, income, older men, social support.

Abbreviations and acronyms: ADL = activities of daily living; CHAMP = Concord Health and Ageing in Men Project; DSSI = Duke Social Support Index; PR = prevalence ratio.

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INTRODUCTION

Population ageing has led to greater importance being placed on maintaining the health of older people.[1] Oral health is an important health issue in older populations that receives limited attention compared with other medical conditions.[2] However, oral health problems in older people can have important consequences including poor nutritional status, systemic health problems and poor quality of life.[3–6]

Most oral health problems in older people are preventable.[7] Regular preventive dental visits are an essential part of maintaining good oral health and for the early diagnosis of oral health-related problems.[8,9]

[Correction added on 10 May 2022, after first online publication: CAUL funding statement has been added.]

The World Health Organization (WHO) has emphasized that preventive oral health services should consider the needs of vulnerable populations, such as older people.[10] However, there is unequal use of these services in the older population. Income, gender, ethnicity, education level, dental insurance coverage, language barriers, access to a dentist and geographic location of clinics are all associated with inequalities in older people's dental visits.[11–16]

An additional factor associated with inequalities in dental visits is social support. Social support is usually classified into structural aspects (network size, variety and density) and functional aspects (actions provided or perceived to be available such as perceived adequacy and feelings of social support).[17–21] Previous studies have reported that older people who have more social interaction, more social participation,

better neighbourhood relationships and are married are more likely to use preventive dental services.[22] Living arrangements, number of close friends and variety of social networks are also factors linked with oral health status in older people.[14,23–31]

Although evidence of the positive relationship between social support and dental visits is increasing, there is a paucity of research on older people using longitudinal data that incorporate various dimensions of social support. In this study, therefore, we examine the relationship between a range of measures of social support and the usual pattern of dental visits 5 years later from a community-based cohort of older Australian men.

MATERIALS AND METHODS

Study participants and data collection

The Concord Health and Ageing in Men Project (CHAMP) is a cohort study of men aged 70 years and older at baseline (2005–2006), drawn from a defined geographical area of Sydney, Australia, through the New South Wales Electoral Roll.[32] As voting is compulsory for Australian citizens, this provides a regularly updated population-representative sampling frame. The only exclusion criterion was living in a residential aged care facility. A total of 1705 men participated in CHAMP at baseline with a response rate of 54%. Participants completed a self-administered questionnaire and attended a clinic at Concord Hospital that included an interview and clinical assessment and were followed up at a 2nd Wave (Wave 2, 2007–2009), 3rd Wave (Wave 3, 2010–2011) and 4th Wave (Wave 4, 2015–2016) assessment. Out of the original sample, 781 men attended the 4th Wave follow-up due to attrition from withdrawal, loss to follow-up and death (Fig. 1).

Information collected at follow-up examinations was essentially the same as at baseline with the addition of nutritional data at Wave 3 and oral health data at Wave 4. Men were seen predominantly in their homes in Wave 4 and assessments included the standardized comprehensive oral health assessment and dental health behaviour questions.[33]

The CHAMP study was approved by the Sydney Local Health Service Human Research Ethics Committee (HERC/14/CRGH/17). Written informed consent was obtained from all participants.

Measures of the usual pattern of dental visits 5 years later and social support

The dependent variable was the usual pattern of dental visit frequency based on information collected in Wave 4. The question was: 'How often do you usually visit a dental professional (dentist/dental prosthetist/dental technician/dental hygienist) about your teeth, dentures or gums?' Available responses were: (i) two or more times per year, (ii) once a year, (iii) once every 2 years, (iv) less often than once every 2 years and (v) I have never been to the dentist. There were no respondents who had never been to the dentist. For this study, the answers were grouped as 'one or more times per year' (i and ii) and 'less than one time per year' (iii and iv). One or more dental visits per year have been previously used in Australia to indicate a 'favourable dental visiting pattern'.[34]

The exposure of interest was social support which consists of the two domains of structural and functional social support. We used social support measures collected in Wave 3 for this analysis. Structural social support was assessed by marital status, living arrangements, the number of family and non-family supports, and the frequency of social interactions. Marital status was divided into married/partnered and other. Two separate living arrangement variables were used: living alone (yes/no) and living with children/grandchildren (yes/no). Family and non-family network sizes were obtained from a modified question in the 11-item Duke Social Support Index (DSSI),[35] 'How many persons within 1 h travel of your home do you feel you can depend on or feel very close to?', with responses separated into family and non-family supports. Responses were dichotomized based on the presence or absence of supports (yes = having one or more persons, no = having no one).

The score for frequency of social interactions was based on three items of the DSSI about the number of times spent with someone who the participant does not live with, the number of times the participant talked to someone on the telephone and the number of times the participant attended meetings of social clubs, religious meetings or other groups within the past week. Each item had eight frequency options from 'none' to 'seven or more' and a score of one point was assigned to 'none', two points to 'once or twice' and three points to 'three times or more'. Functional social support was measured based on seven items in the DSSI, with six items covering participants' involvement in relationships and perceived availability and adequacy of relationships. Three answers are possible: 'hardly ever' (one point), 'some of the time' (two points) or 'most of the time' (three points). The final item of functional social support in the DSSI measures participants' satisfaction with their relationship with family or friends with three possible answers: 'very dissatisfied' (one point), 'somewhat dissatisfied' (two points) or 'satisfied' (three points).

Covariates

Age, country of birth, income, education, English proficiency, health and functioning (comorbidities,
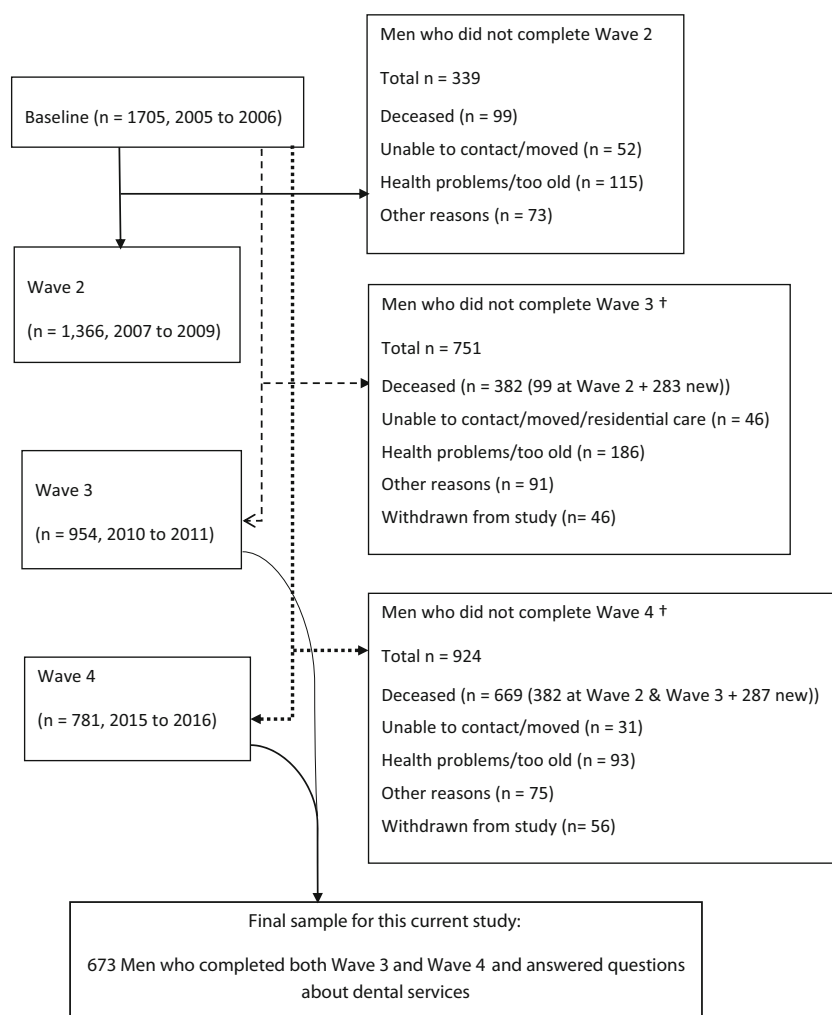
Fig. 1 Flow chart of the CHAMP study sample from baseline to the 4th wave.

depressive symptoms and activities of daily living), driving and smoking status were collected through both the self-completed questionnaire and clinical health assessments in Wave 3. Age was analysed as a continuous variable. Country of birth was grouped into three categories: Australia, Italy/Greece and Other. Income was categorized into three groups according to the source: pension only, pension plus other sources and other income only which includes any possible combinations of superannuation, business earnings and wages. Education was defined by age at leaving school (left school at the age of 12 years or younger vs. older than 12 years).

English proficiency was assessed in those who have learnt English after the age of 12 years. Participants self-assessed their ability to speak in English as very well, well, not well and not at all. Men who first learnt to speak English before 12 years of age or men who self-reported speaking English very well or well were grouped as 'proficient in English'. Men who

reported speaking English not well or not at all were grouped as 'not proficient in English'.

Information on comorbidities was measured by participant reports on whether a doctor or health-care provider had ever told them that they had any of the following 17 diseases: angina, arthritis, cancer (excluding non-melanoma skin cancers), chronic kidney disease or kidney failure, chronic obstructive lung disease, congestive heart failure, coronary artery disease or myocardial infarction, diabetes, epilepsy, hypertension, intermittent claudication, liver disease, osteoporosis, Paget's disease, Parkinson's disease, stroke or thyroid dysfunction. Activities of daily living (ADL)[36] were also collected. The reporting of 'help needed' in one or more categories of ADL indicated the presence of a disability limiting the full capacity for self-care. Depressive symptoms were measured using the 15-item Geriatric Depression Scale.[37] Driving status was assessed by the question 'Do you drive at least once in a while?' (yes/no). Smoking status was self-reported

and grouped into three categories: current smoker, ex-smoker and never smoker.

Statistical analysis

Means, standard deviations and medians for non-normally distributed data were used to present the distribution of continuous variables (age, social interaction score, social satisfaction score, number of comorbidities and depression score) by the usual pattern of dental visits. Numbers and percentages were used to show the distribution of categorical variables (education, country of birth, English proficiency, income source, marital status, living arrangement, family support, non-family support, ADL disability and driving behaviour) by the usual pattern of dental visits. As the study outcome 'regular dental visits' is common, Poisson regression with robust variance was used to examine the association between the outcome and each social support variable whilst controlling for covariates.[38]

We first constructed univariable models for social support measures and other covariates, then constructed models sequentially adjusted for variables found to be important predictors of dental/health service use in past research. Model 1 included univariable models for social support measures without adjustment. Model 2 included and adjusted for sociodemographic variables and driving status: age, country of birth, education level, English proficiency, income source and driving status. Model 3 further adjusted for health-related factors: ADL disability, comorbidity, depression score and smoking status. We also tested for two-way interactions between each social support variable and usual pattern of dental visits in the full multiple regression models. A sensitivity analysis for Models 1–3 was also performed using social support and covariates at Wave 4 rather than Wave 3. All data analyses were performed using SAS Enterprise Guide 7.1.

RESULTS

Out of the 688 men who participated in both Wave 3 and Wave 4, 15 had missing data for their usual pattern of dental visit frequency and were excluded from the analyses, leaving a final sample of 673 men. Of these, 62.9% (n = 423) reported visiting a dental service provider one or more times a year (Table 1). There were no men who had never used dental services. Of those with regular dental visits, 89% had left school after the age of 12 years, more than half were born in Australia and 74% were proficient in English. Half of the men who did not have the recommended frequency of dental visits had the pension as their only source of income. There were no important

differences in terms of age, health status and social support at Wave 3 between those attending and not attending regular dental visits.

In univariable Poisson regression models (Table 2), there were no differences in the likelihood of having regular dental visits between different types or levels of social support. This lack of difference by type and level of social support remained in multivariable models. The only consistent predictor in our study for older men's usual pattern of dental visits 5 years later across all models was income source. Table 3 presents the results of Poisson regression models for each sociodemographic factor and driving behaviour and shows that compared with men who have the pension as their only source of income, men who have other income sources and do not receive any pension are more likely to regularly use dental services (prevalence ratio (PR): 1.35, 95% CI: 1.15–1.57). Both English proficiency and education level had borderline associations with frequent dental visits in Model 1: older men proficient in English and those with a higher education level were more likely to frequently visit dental services (Table 3). However, these associations were reduced after adjustment for other sociodemographic variables including income source. There were no statistically significant interactions identified.

In the sensitivity analysis using social support at Wave 4 as the exposure of interest, the frequency of social interactions had a borderline statistically significant relationship with the usual pattern of dental visits (PR: 1.02, 95% CI: 1.00–1.03). However, the relationship disappeared after adjustment (Table S1).

DISCUSSION

The key findings from this study are that neither structural nor functional social support predicts older men's usual pattern of dental visit frequency 5 years later. The only factor predictive of the pattern of dental visits in our study was being solely reliant on the pension for income, a proxy for low income. This relationship remained after adjustment for other sociodemographic and health status measures.

The majority of studies demonstrating a significant positive relationship between both structural and functional social support and older people's dental visits have been of cross-sectional design.[12,22,26,39–42] A further longitudinal study found a positive association, but the measure of social support was limited to the number of people participants who were in contact with.[43] Only one other longitudinal study examined comprehensive social support measures (including marital or cohabitation status, size of personal social network, frequency of face-to-face contact, parental status and quality of social relationships) and found that being single[44] was

Table 1. Wave 3 characteristics of participants by the usual pattern of dental visits at Wave 4, the CHAMP study*

Wave 3 characteristics	Usual pattern of dental visits Wave 4 (n = 673)	
	1 or more times per year (n = 423)	Less than 1 time per year[†] (n = 250)
Sociodemographic characteristics		
Age, years (mean, SD and median)	80.2 (4.1, 80)	81.0 (4.4, 80)
Education (%)		
Left school ≤12 y/o (n = 89)	10.5	16.7
Left school >12 y/o (n = 591)	89.5	83.3
Missing (n = 8)		
Country of birth (%)		
Australia (n = 355)	54.4	48.4
Greek or Italy (n = 166)	22.5	26.0
Other countries (n = 167)	23.2	25.6
English proficiency (%)		
Proficient (n = 438)	74.2	67.6
Not proficient (n = 176)	25.8	32.4
Missing (n = 74)		
Income source (%)		
Pensions only (n = 239)	31.8	50.2
Pensions and other income (n = 151)	25.6	23.7
Other income only (n = 223)	42.6	26.0
Missing (n = 75)		
Structural social support		
Marital status (%)		
Married/de facto (n = 474)	78.0	76.6
Not married (n = 136)	22.0	23.4
Missing (n = 78)		
Lives alone (%)		
Yes (n = 116)	20.4	16.9
No (n = 498)	79.6	83.1
Missing (n = 74)		
Lives with children/grandchildren (%)		
Yes (n = 86)	13.1	15.1
No (n = 528)	86.9	84.9
Missing (n = 74)		
Has family support (%)		
Yes (n = 578)	93.3	95.4
No (n = 36)	6.7	4.6
Missing (n = 74)		
Has non-family support (%)		
Yes (n = 530)	87.1	86.3
No (n = 84)	12.9	13.7
Missing (n = 74)		
Social interaction score (mean, SD and median)	9.0 (1.4, 9)	9.0 (1.4, 9)
Functional social support		
Social satisfaction score (mean, SD and median)	19.6 (2.0, 20)	19.4 (2.1, 20)
Health status		
ADL disability (%)		
No disability (n = 565)	93.8	90.4
≥1 disability (n = 49)	6.2	9.6
Missing (n = 74)		

(continued)

Table 1 (continued)

Wave 3 characteristics	Usual pattern of dental visits Wave 4 (n = 673)	
	1 or more times per year (n = 423)	Less than 1 time per year[†] (n = 250)
Number of comorbidity (mean, SD and median)	2.3 (1.5, 2)	2.3 (1.6, 2)
Depression score (mean, SD and median)	1.9 (2.2, 1)	1.8 (2.0, 1)
Smoking status (%)		
Current smoker (n = 12)	8 (2.1)	4 (1.8)
Ex-smoker (n = 337)	223 (58.2)	114 (52.1)
Never smoker (n = 253)	152 (39.7)	101 (46.1)
Missing (n = 71)		
Driving once in a while (%)		
Yes (n = 510)	85.3	80.8
No (n = 104)	14.7	19.2
Missing (n = 74)		

*Data are mean (SD and median) for continuous variables or percent for categorical variables, unless otherwise stated.
[†]No men reported that they had never been to the dentist.

associated with less frequent use of dental services. These findings are in contrast to our results.

There are a number of potential reasons for the divergent findings between studies. Our study has a relatively high rate of regular dental visits than other studies. For example, there were no men who reported that they had never used dental services and 34.7% visited dental services twice a year (Table S2), whilst in the other two longitudinal studies, 15% (in England, Scotland and Wales) and 82% (in Norway and Sweden) of participants had used dental services at least once every year. This could be because the suburbs chosen for recruitment in the CHAMP study are now relatively wealthy areas and most of the CHAMP participants own their own homes.[45] However, despite this, we still found that income source was the key determinant of the use of dental services in our study, indicating that despite the relative wealth of the area, some residents might still not have sufficient income to use dental services regularly.

The other potential reason is that their usual pattern of dental visits was self-reported in CHAMP and used a broader definition of dental visits than in other studies. For example, dental visits in CHAMP included visits to all types of dental professionals including dentists, dental prosthetists, dental technicians and dental hygienists, for any issues relevant to teeth, dentures and gums. Another reason behind our differing findings could be the different measures of social support. For example, in the only other longitudinal study with comprehensive measures of social support, a borderline significant relationship was found between social relationship quality[44] and dental

Table 2. Associations between social support and usual pattern of dental visits by Poisson regression, the CHAMP study

Wave 3 (2010–2011)	≥1 regular dental visit per year in Wave 4 (2015–2016)					
	Model 1		Model 2		Model 3	
	PR	95% CI	PR	95% CI	PR	95% CI
Structural social supports						
Not married	0.97	0.84–1.13	0.97	0.84–1.12	0.96	0.83–1.11
Lives alone	1.06	0.92–1.23	1.07	0.93–1.24	1.05	0.91–1.22
Not living with children/grandchildren	1.05	0.87–1.26	1.00	0.83–1.20	1.01	0.84–1.21
No family support	1.14	0.92–1.41	1.18	0.95–1.46	1.16	0.93–1.44
No non-family support	0.97	0.81–1.17	0.99	0.82–1.19	0.97	0.80–1.17
Social interaction score	1.02	0.96–1.05	0.99	0.95–1.03	0.99	0.95–1.04
Functional social supports						
Social satisfaction score	1.02	0.99–1.06	1.01	0.98–1.04	1.02	0.99–1.06

CI = confidence interval; PR = prevalence ratio.
Model 1: univariable model. Model 2: adjusted for age (continuous), country of birth, education level, English proficiency, income source and driving behaviour. Model 3: Model 2 further adjusted for: ADL disability, number of comorbidities (continuous), depression score (continuous) and smoking status.

Table 3. Associations between sociodemographic, and driving behaviour factors and usual pattern of dental visits by Poisson regression, the CHAMP study

Wave 3 (2010–2011)	≥1 regular dental visit per year in Wave 4 (2015–2016)					
	Model 1		Model 2		Model 3	
	PR	95% CI	PR	95% CI	PR	95% CI
Age (continuous, reference = 73)	0.98	0.97–1.00	0.99	0.93–1.58	0.99	0.97–1.00
Education (reference = left school ≤12 years)	1.24	0.98–1.56	1.10	0.84–1.45	1.21	0.92–1.59
Country of birth (reference = Australia)	1		1		1	
Italy or Greek	0.91	0.78–1.07	1.10	0.84–1.45	1.01	0.83–1.22
Other countries	0.90	0.77–1.05	0.96	0.82–1.13	0.93	0.79–1.08
English proficiency (reference = proficient)	1.12	0.97–1.30	1.01	0.79–1.29	0.90	0.70–1.17
Other income source (reference = pension only)	1.35	1.18–1.55	1.32	1.14–1.54	1.35	1.15–1.57
Driving behaviour (reference = drives once a while)	0.89	0.75–1.07	1.00	0.83–1.21	1.00	0.82–1.22

CI = confidence interval; PR = prevalence ratio.
Model 1: univariable model. Model 2: multivariable model with all sociodemographic variables and driving behaviour. Model 3: Model 2 further adjusted for all health and functioning variables and smoking status.

service use. However, this measure of relationship quality was focused on the quality of the relationship between participants and their nominated closest person. In contrast, our study assessed the quality of broader social relationships of older people rather than just being limited to a single person.

Another difference is the timing of measurements. Our sample involves comparatively older participants. In Stafford's study, social support data were collected when participants were in middle age and younger old age (between 53 and 69 years of age) and dental visit data were collected at ages 68–69 years.[44] In contrast, our men were all older than 75 years when reporting social support and their usual pattern of dental visits. A qualitative study found that older people 'go through a process of option balancing' when deciding to visit dental services or not.[46] They weigh up benefits such as good oral health and good appearance vs. costs such as time and money. They also consider not only the costs of current dental visits but also future living costs. Since the majority of middle-aged and younger old people are still engaged in paid work or only recently retired, the financial strain of visiting dental services might not be such an important concern.

We found a borderline significant positive association between English proficiency, education and usual pattern of dental visits. However, these effects reduced in magnitude after adjustment for other sociodemographic variables. It is likely that this borderline significant association was being driven by the association that being from a migrant background with low English proficiency and having low education have with being solely reliant on the pension in older age.

Currently, dental services in Australia are not covered by Medicare, the national health-care system which covers some or all health costs for Australians. However, a few governmental schemes are available

for dental service expenditure but only for specific populations. These include the Child Dental Benefits Schedule, the Cleft Lip and Palate Scheme and the Department of Veterans' Affairs Scheme.[47] State and Territory Governments also provide dental services for low-income residents that meet specific eligibility criteria. These programmes are often linked to national partnership agreements with the Commonwealth government to reduce public dental waiting lists. It was estimated that in 2017–2018, dental care expenditure is the second largest health expenditure for Australian individuals[48] and that this expenditure is largely out-of-pocket or through private health insurance and rebates.

The Australian Institute of Health and Welfare 2021 Oral Health and Dental Care in Australia Report found that approximately 39% of Australians over 15 years of age avoided or delayed visiting a dentist due to cost and that those with private health insurance had lower rates of avoidance (29%) due to cost than those without insurance (52%).[49] Another Australian study, based on the 2008 National Dental Telephone Interview Survey, also reported that 45.4% of adults who avoided or delayed visiting a dentist did so because of cost.[50] It has been suggested that greater emphasis on system-level factors that improve the access of older pensioners to dental services is needed to improve the oral health of older people. This has included strong advocacy in Australia to include access to dental care under Medicare[47] or as recommended by the Royal Commission into Aged Care Safety and Quality, a Seniors Dental Benefits Scheme (Recommendation 60).[51] This system extension of regular access to dental care under a national health service would reduce this important barrier to preventive dental care for older Australians, as it would appear to users to be essentially either a free service or one available for a small co-payment fee. Our study results provide some support for this approach by finding that being solely reliant on the pension was the key predictor of reduced use of dental services.

Our study has important strengths including the longitudinal design and the use of a population-representative study sample. We had access to several measures of both structural and functional social support as well as a broad range of sociodemographic factors. However, our study also has some limitations. Data analysed were all self-reported and limited to the variables available in our data. There might be other factors that also impact the pattern of regular use of dental services in older men such as private health insurance, oral health literacy and attitudes towards dental services.[52–54] In addition, as our study only includes older men, the findings might not be generalizable to older women or other age groups. Finally, the significant association between income

source and usual pattern of dental visits is small in size. However, this relationship remained after adjusting for other factors and was the only significant factor associated with their usual pattern of dental visits following multivariable adjustment in our study.

In summary, we found no difference in the pattern of regular dental visits between older men with different levels and types of social support. We, however, found that total reliance on the pension for income predicts a pattern of lower frequency of regular dental visits regardless of social support or any other sociodemographic factor.

CONFLICT OF INTEREST STATEMENT

All COI disclosure forms from all authors are attached with this submission.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1. Sensitivity analysis—associations between Wave 4 social supports and Wave 4 usual pattern of dental visits by Poisson regression, the CHAMP study

Table S2. Detailed frequency of Wave 4 usual pattern of dental visits and Wave 3 sociodemographic factors

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