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Low back pain among office workers in three Spanish speaking-countries: findings from the CUPID study

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Abstract

Objectives—To assess differences in the prevalence and incidence of low back pain (LBP) and associated disability among office workers in Costa Rica, Nicaragua and Spain.

Methods—Data were collected at baseline (n=947, 93% response) in November 2007 and at follow-up after 12 months (n=853, 90% response). Six outcome measures were examined: baseline prevalence of (1) LBP in past 12 months, (2) LBP in past month, and (3) disabling LBP in past month; and at follow-up: (4) incidence of new LBP in the past month, (5) new disabling LBP, and (6) persistent LBP. Differences in prevalence by country were characterized by odd ratios (ORs) with 95% confidence intervals (95%CIs), before and after adjustment for covariates.

Results—Prevalence of LBP in the past month among office employees in Costa Rica (46.0%) and Nicaragua (44.2%) was higher than in Spain (33.6%). Incidence of new LBP was 37.0% in Nicaragua (OR=2.49; 95% CI: 1.57-3.95), 14.9% in Costa Rica (OR=0.74; 95% CI: 0.41-1.34), and 19.0% in Spain (reference). Incidence of new disabling LBP was higher in Nicaragua, 17.2%

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Conflict of interest
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(OR=2.49; 95% CI: 1.43-4.34) and Costa Rica, 13.6% (OR=1.89; 95% CI: 1.03-3.48) than Spain (7.7%), while persistence of LBP was higher only in Nicaragua.

Conclusions—Prevalence of LBP and disabling LBP was higher in Costa Rican and Nicaraguan office workers than in Spain, but incidence was higher mainly in Nicaragua. Measured sociodemographic, job-related and health-related variables only partly explained the differences between countries, and further research is needed to explore reasons for the remaining differences.

Keywords

Cross-national studies; Longitudinal; Musculoskeletal pain; Risk factors

Background

Low back pain (LBP) is a worldwide health problem (1–3), a major cause of sickness absence and disability (4,5) and is costly (3,5). It is a leading cause of disability in workers younger than 45 years, and has a lifetime prevalence of 60% to 80% (3,6,7). The prevalence of LBP has been reported to differ substantially by industry and occupation (7), and also to vary by country (8) in relation to income level. A recent study among European countries showed that high income economies had higher prevalence than low- and middle-income economies (9). However, there have been no comparative epidemiological studies in areas such as Central America, which has one of the fastest growing populations in the world, and where there is a lack of reliable data on musculoskeletal health, including on LBP specifically.

Furthermore, it is unknown how the distribution of potential causes of LBP differs in relation to the socioeconomic conditions in countries, and the extent to which they explain international differences in LBP prevalence. Such risk factors may be demographic (e.g. there is a higher prevalence of LBP among older people) (4), physical (e.g., manual material handling has been associated with higher prevalence of LBP) (7,10), psychological (e.g. tendency to somatize has been linked to higher LPB prevalence) (11,12), or psychosocial (e.g., high job demands and low social support have been shown to predict LBP and related disability) (13).

This comparative study aimed (a) to determine the prevalence and incidence of LBP in two middle-income Spanish-speaking countries (Costa Rica and Nicaragua) as compared with Spain, a high income economy; and, (b) to explore whether any differences between the countries persisted after adjustment for confounding by measured risk factors. We focused on office workers using computers since they were expected to have low exposure to physical risk factors for LBP in their employment (systematic review does not support an association of sedentary work with LBP (6)). Moreover, computer-based jobs, which have increased dramatically in the past two decades (8,9), were likely to be fairly standardized across countries.

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Methods

Study design and participants

This was a secondary analysis of data on office workers collected by the Cultural and Psychosocial Influences in Disability (CUPID) study, which explores the influence of culturally determined psychosocial factors on musculoskeletal pain and associated disability (14). CUPID is a worldwide longitudinal study with participants in 18 countries. In our three study countries, office workers regularly using computers (keyboard and/or mouse) were randomly sampled from payroll records (14). Consistent with the criteria applied in the CUPID study as a whole (14), we aimed in each country to recruit at least two hundred 20 to 59 year-old office workers who regularly used computers, and who had worked in their current job for at least 12 months. The sample size was set to enable detection of differences between countries in the prevalence of musculoskeletal symptoms and disability of the magnitude that was expected when the study was being planned (prevalence ratios in excess of two) (14). After being selected from payroll records, and upon consent, participants were interviewed face-to-face at their workplace in Spanish for about 15 to 20 minutes at baseline and then at follow-up 12 months later (14). Data were collected between March 2009 and July 2011 at the central offices of the Costa Rican Social Security System, between February 2008 and November 2010 among office workers from the Ministry of Labor and Nicaraguan Institute of Social Security, and between November 2007 and February 2010 among office workers from four hospitals and a university in Barcelona (Spain) (15). Further sample selection and data collection details have been already published (14). Ethical approval was obtained from The University of Texas Health Science Center Committee for the Protection of Human Subjects, as well as from the relevant institutional review committees in each country.

The overall participation for the three countries was 96% (1,020 participants): Costa Rica, 91%; Nicaragua, 100%; and Spain, 98% (14). Participants not meeting the inclusion criteria (i.e. age 20-59 years and work in their current job for at least one year) were excluded (n=25 in Costa Rica, n=15 in Nicaragua, n=33 in Spain). Thus, the baseline sample comprised 947 people (224 from Costa Rica, 285 from Nicaragua, and 438 from Spain). Participation at follow-up was 90.2% (Costa Rica, 92%; Nicaragua, 89%; and Spain, 90%).

Questionnaire

Baseline and follow-up questionnaires were developed in English (14) and translated into Spanish with back-translation into English for error checkings (15). Each country pilot-tested the questionnaires to ensure questions could be understood by respondents. Information collected at baseline included sociodemographic data (age, sex, education, height, and dominant hand), and job-related data such as occupation, duration of employment in current job, work-related physical activities, job control, social support, job satisfaction and job security. In addition, there was a section on health-related items, with questions on: LBP in the past month and past 12 months (using diagrams similar to the standardized Nordic Questionnaire (16) and the standard definition of back pain (17)); difficulty performing daily activities in the past month because of LBP; awareness of other people with LBP; beliefs about the causes and prevention of back pain (adapted from the

Fear Avoidance Beliefs Questionnaire (18)); awareness of repetitive strain injury or similar terms; mental health (based on the Short Form-36 (19)); and distress from common somatic symptoms (from the Brief Symptom Inventory (20)). The follow-up questionnaire collected data on new or continuing LBP, and difficulty performing daily activities because of LBP in the past month.

Outcomes

The outcomes of interest were measures of LBP, indicated as present or absent in specified periods. Disabling LBP was deemed to occur where participants reported that the symptom had made it difficult or impossible to perform specified activities such as cutting toe nails, getting dressed and doing normal jobs around the house.

We defined three outcome measures at baseline and three at follow-up. Baseline measures were (1) prevalence of LBP in past 12 months, (2) prevalence of LBP in past month, and (3) prevalence of disabling LBP in the past month. Follow-up measures were: (4) incidence of new LBP (i.e., prevalence of LBP in the past month at follow-up among those who had been free from LBP in the past month at baseline – taken as a proxy for incidence), (5) incidence of new disabling LBP (i.e., prevalence of disabling LBP in the past month at follow up among participants who did not have disabling LBP in the past month at baseline – again, a proxy for incidence), and (6) persistence of LBP (i.e., prevalence of LBP in the past month at follow-up among those who had experienced LBP in the past month at baseline).

Independent variable and covariates

The independent variable was country: Costa Rica, Nicaragua, or Spain (taken as the reference). We examined the following covariates: (a) sociodemographic variables, including sex, age, years of education, and height; (b) variables related to employment, including years worked in current job, hours worked per week, type of contract, other jobs; (c) physical demands of the current job in an average working day such as use of a keyboard and other wrist/hand movements for more than four hours, repeated elbow-bending, work with the hands above shoulder height for more than one hour, lifting 25 kg/56 lbs. by hand, kneeling or squatting for more than one hour, and climbing up or down 30 or more flights of stairs; (d) psychosocial job demands, including incentives (piecework payment), bonus payments (additional payment if more tasks than agreed are completed in a day), time pressure (target number of tasks needed to be completed in the day or by a fixed time), lack of choice (seldom or never have a choice in deciding: how and what to do at work and work timetable and breaks), lack of support (seldom or never receive support from colleagues or supervisor), job dissatisfaction (dissatisfied or very dissatisfied with job), and perception of job insecurity (feel job would be unsafe or very unsafe if off work for three months with illness); and (e) variables related to health (adverse beliefs about LBP, awareness of the term “repetitive strain injury”, awareness of someone at work or outside work with LBP, somatizing tendency and mental health). Adverse beliefs about LBP were characterized by three variables: (1) belief that such pain is commonly caused by people’s work (classed as present if the participant completely agreed), (2) belief that physical activity is harmful, which was deemed to be present if the participant completely agree that physical activity should be avoided and that rest is needed to recover from LBP), and (3) belief that LBP has

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a poor prognosis (present if the participant completely agreed that neglecting LBP can cause permanent health problems and completely disagreed that LBP usually improves within three months). Somatizing tendency was scored according to the number of somatic symptoms (faintness or dizziness, chest pains, nausea or upset stomach, difficulty breathing, numbness or tingling, feeling weak in parts of the body, hot or cold spells) in the past week that had been at least moderately distressing. Mental health was dichotomised as good or intermediate/poor (14).

Statistical analysis

Chi-squared tests were used to compare participants' characteristics between the countries. To assess associations [odd ratios (ORs) and corresponding 95% confidence intervals (95% CIs)] between the risk factors under study and the LBP outcomes, we used logistic regression. We created separate models for prevalence, incidence and persistence of pain and built multivariable models following Hosmer and Lemeshow's recommendations (21). In order to analyze the large number of covariates on which information was available, as suggested by Amick *et al.* (22), we grouped them into categories (i.e., sociodemographic variables, employment variables, job demands, and health-related characteristics). First, bivariate associations between each outcome and covariate were examined. Covariates with a p-value of <0.25 were then entered into two separated multivariable models grouping in one model all the sociodemographic, employment and health-related variables, and in another, the variables related to physical and psychosocial job demands. Covariates with p-values of <0.10 in these models were then entered together into a single multivariable model and those with a p-value of <0.05 (Table 1) were used for adjustment of the models examining the association between country (Spain as the reference) and each of the six health outcomes. The final models had good fit according to Hosmer and Lemeshow's goodness-of-fit test (21). The statistical analyses were carried out in Stata v. 13 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP) (23).

Results

The characteristics of participants and prevalence of covariates are presented in Table 1. Spain had the largest participation of women (83.6%) followed by Nicaragua (72.6%) and Costa Rica (62.5%), and participants in Spain were older than in Costa Rica and Nicaragua. Use of a keyboard for more than four hours per day was common in all three countries (≥ 89.8%), whereas only 59 participants reported lifting loads ≥25 kg by hand in their work, the prevalence being higher in Nicaragua (13.3%) than in Costa Rica (5.4%) or Spain (2.1%). Among the psychosocial demands of work, time pressure was reported more frequently in Nicaragua (80.0%) and Costa Rica (78.1%) than Spain (54.3%), lack of support from supervisors/co-workers was most frequent in Nicaragua (40.4%), and the presence of incentives (piece work or payment of a bonus for additional articles/tasks completed per day) in Costa Rica (63.2%). Beliefs that LBP has a poor prognosis were more common in Costa Rica and Spain, while awareness of the term "repetitive strain injury" was highest in Spain (59.8%), as were knowing someone at work and outside work with LBP (approximately 80%). In contrast, report of distress from multiple somatic symptoms and of poor mental health was more frequent in Costa Rica and Nicaragua.

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Table 2 summarizes the crude and adjusted ORs for prevalent LBP and disabling pain at baseline by country. Crude ORs were significantly elevated for Costa Rican and Nicaraguan participants relative to Spain, with values ranging from 1.37 to 2.16. After adjustment for other risk factors (see Table 2 footnote), the ORs were somewhat reduced to between 1.18 and 1.98, but all except two remained significant. Costa Rica had the highest risks for pain prevalence overall, but disabling pain was slightly more common in Nicaragua than in the other countries.

At follow up, new LBP had developed in 120 of the 527 participants who were initially free from LBP, new disabling pain in 78 of the 671 who did not have it at baseline, and pain was persistent in 206 of the 325 who had it at baseline. The prevalence of new LBP and new disabling LBP was higher in Nicaragua (37.0% and 17.2%, respectively) than in Costa Rica (14.9% and 13.6%) or Spain (19.0% and 7.7%) (Table 3). Crude and adjusted ORs for Nicaragua were approximately 2.5 higher relative to Spain. For Costa Rica, the prevalence of new LBP was lower than in Spain, but that of new disabling LBP was almost 2-fold higher. These differences remained after adjustment for covariates (see Table 3 footnote).

Discussion

We found disparities in low back pain between countries that share similarities of culture but are at different levels of the income per capita spectrum. This is the first study assessing the prevalence and incidence of LBP and associated disability among office workers in low-and-middle income economies, and comparing them with people carrying out similar work in a high-income economy. We found that LBP was common among office workers, but with a higher prevalence of pain and disabling pain in Costa Rica and Nicaragua than Spain. Prevalence of new LBP at follow-up was higher in Nicaragua than in Spain, but not in Costa Rica. The differences between countries persisted after adjustment for sociodemographic variables, aspects of employment, physical, psychosocial demands of work, and health-related factors.

Comparing our findings to other CUPID countries, we found a higher LBP prevalence in past month among office workers in Costa Rica (46.0%) and Nicaragua (44.2%) than, for example, those reported in Japan (22%) (24) and Sri Lanka (12%) (25). LBP prevalence in last 12 months in Costa Rica (67.9%) and Nicaragua (61.1%) was also higher than among office workers in New Zealand (45%) (26) and office clerks in the 27-country Fourth European Working Conditions Survey (42.3%) (27). The prevalence of disabling LBP was higher in Nicaragua and Costa Rica than in the CUPID study overall (22%) (29) and in Sri Lanka (7%) (25). However, the scope for comparison with other CUPID countries is limited at this time, as only a few have reported results on incidence and persistence of LBP.

Using data from other studies, a systematic review on the epidemiology of LBP found the 1-year incidence of LBP to lie in a range from 1.5% to 36% (8). Our finding for the one-month prevalence of new LBP in Costa Rica (14.9%) is within this range, whereas that for Nicaragua (37.0%) is slightly higher. The same systematic review reported 1-year prevalence for LBP in a range from 0.8% to 82.5%, and our results for Costa Rica (67.9%) and Nicaragua (61.1%) are within this range (8). Because only a limited number of studies have

examined differences between countries in the prevalence of LBP among workers, we also compared our results to findings from a systematic review of population-based studies of LBP (28). That review indicated lower 1-year (38.0%) and 1-month prevalence (30.8%) than the corresponding for office workers from Nicaragua and Costa Rica in our study. It is unclear which risk factors account for this difference.

Nowadays, sitting is the most common posture in the workplace (30), including among office workers who, in addition, use computers frequently. In our study, more than 89.8% of participants reported using a keyboard during more than four hours of their working day, a task almost always performed while sitting. However, associations between sedentary work and LBP have been inconsistent, and there is no clear evidence that prolonged sitting at work predisposes to LBP (6). Nevertheless, the 1-month prevalence of LBP in our Costa Rican (46.0%) and Nicaraguan (44.2%) office workers was similar to that among nurses in Brazil (45.1%), and Italy (49.1%) (31), and the 12-month prevalence of LBP (over 60%) among office workers in Costa Rica (67.9%) and Nicaragua (61.1%) was higher than the corresponding prevalence among nurses in Australia (56%) (32), Estonia (56.1%) (33), and New Zealand (57%) (26). These results suggest that physical loading, such as from lifting patients, may not be pivotal in determining the prevalence of LBP in the occupational groups studied. Perhaps there were other unmeasured exposures either at work or elsewhere (e.g., leisure time physical activities, body weight) that varied by occupational group and contributed to their experience of LBP.

We did not find associations of reported physical demands of work, either with new disabling LBP or with persistence of LBP, but the occupational groups that we considered in our analysis had low exposure to the types of activity that have been linked most consistently with LBP such as heavy lifting more than 25 kg by hand. In contrast, among the other covariates examined, we found several that were related to the LBP outcomes, including awareness of someone at work with LBP, somatizing tendency and poor mental health. Regarding persistence of pain, the significant risk factors were having a short-term contract, health beliefs regarding pain, and awareness of the concept of repetitive strain injury or a similar term. Our results are consistent with several other studies regarding somatization and mental health. For example, another CUPID study that used data from New Zealand, reported similar results for the association between somatizing tendency and LBP (34). A CUPID study with Spanish data reported that low mood and somatizing tendency were more strongly associated with incidence than persistence of LBP (15), which is also supported by our results.

Despite adjustment for these factors, differences between countries persisted, ranging from 1.2 to 2 fold for prevalence of LBP in Costa Rica and Nicaragua, compared to Spain, and about 2-fold for incidence in Nicaragua relative to Spain. Questions about what might explain the differences between these countries therefore remain. Possibilities include, unmeasured ergonomic factors (e.g., design of chairs, and/or work stations), physical demands (e.g., frequency of breaks from sitting), or non-occupational activities (e.g., hobbies, sports). In addition, we focused on three countries that shared a cultural background as reflected by a common language that influences how the world is perceived and cognitively constructed (35,36). However, unmeasured cultural aspects such as

Hofstede's dimensions (e.g., power distance, uncertainty avoidance and masculinity) (37) or social characteristics (e.g., social networks, trust and participation) (38) might in part explain the differences in LBP between countries we found in this study. Future research is needed to explore this hypothesis.

Strengths of our study were its longitudinal design, the collection of data using standardized questions (14), and the very high response (over 90%) at both baseline and follow-up. Limitations include potential selection bias related to the healthy worker effect (39) since workers with severe LBP could have been absent during the baseline data collection resulting in underestimation of prevalence and persistence of pain at follow up. Another possible limitation was information bias due to varying interpretation of pain in different cultures (29), although any such bias should have been reduced through the use of pain diagrams. Recall bias may have affected our findings since we relied on participants' ability to recall pain during the previous year and past month. Although persistent pain was defined as being present at both baseline and follow-up, it is possible that some cases were transiently pain-free in the interval.

In summary, the prevalence of LBP and associated disability was higher among office workers in Costa Rica and Nicaragua than in Spain, but incidence was higher mainly in Nicaragua. The sociodemographic, job-related, psychosocial and health-related variables examined did not fully explain the differences between countries, but poor perceived mental health and somatizing tendency seem to play an important role in the prevalence and incidence of LBP, as well as of disabling LBP. Our study provides information that is lacking in Latin America (40), adding to a scant literature on the prevalence and incidence of LBP among office employees in Central America (41,42). In addition, our findings could be used to develop programs or interventions to prevent LBP among office workers. In clinical settings, time to recover from LBP could be decreased by interventions aimed to improving mental health and reducing the tendency to somatize.

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References

(1). Tissot F, Messing K, Stock S. Studying the relationship between low back pain and working postures among those who stand and those who sit most of the working day. Ergonomics. 2009; 52(11):1402–1418. [PubMed: 19851907]

(2). Hoogendoorn WE, van Poppel MN, Bongers PM, Koes BW, Bouter LM. Physical load during work and leisure time as risk factors for back pain. Scand J Work Environ Health. 1999:387–403. [PubMed: 10569458]

(3). Lis AM, Black KM, Korn H, Nordin M. Association between sitting and occupational LBP. Eur Spine. 2007; 16(2):283–298.

(4). Burdorf A, Sorock G. Positive and negative evidence of risk factors for back disorders. Scand J Work Environ Health. 1997; 23(4):243–256. [PubMed: 9322815]

(5). Roffey DM, Wai EK, Bishop P, Kwon BK, Dagenais S. Causal assessment of occupational sitting and low back pain: results of a systematic review. Spine. 2010; 10(3):252–261.

(6). Hartvigsen J, Leboeuf-Yde C, Lings S, Corder EH. Is sitting-while-at-work associated with low back pain? A systematic, critical literature review. Scand J Public Health. 2000; 28(3):230–239. [PubMed: 11045756]

(7). Bernard, BP., editor. Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health; 1997. DHHHS (NIOSH) Publication No.97-141

(8). Hoy D, Brooks P, Blyth F, Buchbinder R. The epidemiology of low back pain. Best Pract Res Clin Rheumato. 2010; 24(6):769–781.

(9). Farioli A, Mattioli S, Quaglieri A, Curti S, Violante F, Coggon D. Musculoskeletal pain in Europe: the role of personal, occupational, and social risk factors. Scand J Work Environ Health. 2014; 40(1):36–46. [PubMed: 24009006]

(10). National Research Council (US). Panel on Musculoskeletal Disorders, the Workplace, Institute of Medicine (US). Musculoskeletal disorders and the workplace: low back and upper Extremities. Washington, DC: National Academies Press; 2001.

(11). Pincus T, Burton K, Vogel S, Field A. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine. 2002; 27(5):E109–11. [PubMed: 11880847]

(12). Linton SJ. A review of psychological risk factors in back and neck pain. Spine. 2000; 25(9): 1148–1156. [PubMed: 10788861]

(13). Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol. 2004; 14(1):13–23. [PubMed: 14759746]

(14). Coggon D, Ntani G, Palmer KT, Felli VE, Harari R, Barrero LH, et al. The CUPID (Cultural and Psychosocial Influences on Disability) Study: Methods of Data Collection and Characteristics of Study Sample. PLoS ONE. 2012; 7(7):e39820. [PubMed: 22792189]

(15). Vargas-Prada S, Serra C, Martínez JM, Ntani G, Delclos GL, Palmer KT, et al. Psychological and culturally-influenced risk factors for the incidence and persistence of low back pain and associated disability in Spanish workers: findings from the CUPID study. Occup Environ Med. 2012; 70(1):57–62. [PubMed: 22864247]

(16). Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987; 18(3):233–237. [PubMed: 15676628]

(17). Dionne CE, Dunn KM, Croft PR, Nachemson AL, Buchbinder R, Walker BF, et al. A consensus approach toward the standardization of back pain definitions for use in prevalence studies. Spine (Phila Pa 1976). 2008 Jan 1; 33(1):95–103. [PubMed: 18165754]

(18). Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain. 1993; 52(2):157–168. [PubMed: 8455963]

(19). Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care. 1992:473–483. [PubMed: 1593914]

(20). Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. Psychol Med. 1983; 3:595–605.

(21). Hosmer, DW., Lemeshow, S. Applied logistic regression. New York, NY: John Wiley & Sons; 2000.

(22). Amick BC III, Habeck RV, Ossmann J, Fossel AH, Keller R, Katz JN. Predictors of successful work role functioning after carpal tunnel release surgery. J Occup Environ Med. 2004; 46(5): 490–500. [PubMed: 15167398]

(23). StataCorp. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP; 2013.

(24). Matsudaira K, Palmer KT, Reading I, Hirai M, Yoshimura N, Coggon D. Prevalence and correlates of regional pain and associated disability in Japanese workers. Occup Environ Med. 2011; 68(3):191–196. [PubMed: 20833762]

(25). Warnakulasuriya S, Peiris-John R, Coggon D, Ntani G, Sathiakumar N, Wickremasinghe A. Musculoskeletal pain in four occupational populations in Sri Lanka. Occup Med. 2012; 62(4): 269–272.

(26). Harcombe H, McBride D, Derrett S, Gray A. Prevalence and impact of musculoskeletal disorders in New Zealand nurses, postal workers and office workers. Aust N Z J Public Health. 2009; 33(5):437–441. [PubMed: 19811479]

(27). Niu S. Ergonomics and occupational safety and health: An ILO perspective. Appl Ergon. 2010; 41(6):744–753. [PubMed: 20347066]

(28). Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, et al. A systematic review of the global prevalence of low back pain. Arthritis Rheum. 2012; 64(6):2028–2037. [PubMed: 22231424]

(29). Coggon D, Ntani G, Palmer KT, Felli VE, Harari R, Barrero LH, et al. Disabling musculoskeletal pain in working populations: Is it the job, the person, or the culture? Pain. 2013; 154(6):856–863. [PubMed: 23688828]

(30). Lee P, Helewa A, Goldsmith CH, Smythe HA, Stitt LW. Low back pain: prevalence and risk factors in an industrial setting. J Rheumatol. 2001; 28(2):346–351. [PubMed: 11246674]

(31). Carugno M, Pesatori AC, Ferrario MM, Ferrari AL, Silva FJ, Martins AC, et al. Physical and psychosocial risk factors for musculoskeletal disorders in Brazilian and Italian nurses. Cad Saude Publica. 2012; 28(9):1632–1642. [PubMed: 23033179]

(32). Urquhart DM, Kelsall HL, Hoe VC, Cicuttini FM, Forbes AB, Sim MR. Are psychosocial factors associated with low back pain and work absence for low back pain in an occupational cohort? Clin J Pain. 2013; 29(12):1015–1020. [PubMed: 23370089]

(33). Freimann T, Coggon D, Merisalu E, Animägi L, Pääsuke M. Risk factors for musculoskeletal pain amongst nurses in Estonia: a cross-sectional study. BMC Musculoskelet Disord. 2013; 14(1):334. [PubMed: 24289649]

(34). Harcombe H, McBride D, Derrett S, Gray A. Physical and psychosocial risk factors for musculoskeletal disorders in New Zealand nurses, postal workers and office workers. Inj Prev. 2010; 16(2):96–100. [PubMed: 20363815]

(35). Bender A, Beller S. Current Perspectives on Cognitive Diversity. Front Psychol. 2016; 7:509. [PubMed: 27148118]

(36). Everaert MB, Huybregts MA, Chomsky N, Berwick RC, Bolhuis JJ. Structures, not strings: linguistics as part of the cognitive sciences. Trends Cogn Sci (Regul Ed). 2015; 19(12):729–743. [PubMed: 26564247]

(37). Hofstede, G., Hofstede, G., Minkov, M. Cultures and Organizations: Software of the Mind. 3rd ed. New York: McGraw-Hill; 2010.

(38). Mansyur CL, Amick BC, Franzini L, Roberts RE. Culture and the social context of health inequalities. Int J Health Serv. 2009; 39(1):85–106. [PubMed: 19326780]

(39). Vargas-Prada S, Martinez JM, Coggon D, Delclos G, Benavides FG, Serra C. Health beliefs, low mood, and somatizing tendency: contribution to incidence and persistence of musculoskeletal pain with and without reported disability. Scand J Work Environ Health. 2013; 39(6):589–598. [PubMed: 23955508]

(40). Ortiz-Hernandez L, Tamez-Gonzalez S, Martinez-Alcantara S, Mendez-Ramirez I. Computer use increases the risk of musculoskeletal disorders among newspaper office workers. Arch Med Res. 2003; 34(4):331–342. [PubMed: 12957532]

(41). Jackson T, Thomas S, Stabile V, Han X, Shotwell M, McQueen K. Prevalence of chronic pain in low-income and middle-income countries: a systematic review and meta-analysis. The Lancet. 2015; 385(2):S10.

(42). Obregon-Ponce A, Iraheta I, Garcia-Ferrer H, Mejia B, Garcia-Kutzbach A. Prevalence of musculoskeletal diseases in Guatemala, Central America: the COPCORD study of 2 populations. J Clin Rheumatol. 2012; 18(4):170–174. [PubMed: 22647863]

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What is already known on this subject

- Low back pain is a worldwide health problem with a lifetime prevalence of 60% to 80%, and is a major cause of sickness absence and disability.
- Most research on low back pain comes from western countries, and there is lack of information from low and middle income regions such as Central America, which has one of the fastest growing populations in the world.

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What this paper adds

- Despite cultural similarities, there is higher prevalence of low back pain among office workers in Costa Rica and Nicaragua, two Central American low- and middle-income countries, than in Spain, a higher income country.
- Differences in LBP persisted after adjustment for sociodemographic variables, aspects of employment, physical, psychosocial demands of work, and health-related factors.
- Somatizing tendency and poor mental health were associated with LBP prevalence and incidence but not with persistence of pain.
- This study's findings add to the scarce literature on prevalence and incidence of LBP among office employees in Central America.

Table 1

Sample characteristics by country.

	Costa Rica (n = 224)		Nicaragua (n = 285)		Spain (n = 438)	
	N	%	n	%	n	%
Sociodemographic characteristics						
Sex						
Male	84	37.5	78	27.4	72	16.4
Female	140	62.5	207	72.6	366	83.6
Age (years)						
20-29	73	32.6	95	33.3	73	16.7
30-39	64	28.6	100	35.1	165	37.7
40-49	56	25.0	63	22.1	152	34.7
50-59	31	13.8	27	9.5	48	11.0
Employment-related characteristics						
Contract type						
Permanent	189	85.1	279	98.9	352	80.4
Temporary	33	14.9	3	1.1	86	19.6
Any other job(s)	17	7.6	10	3.5	19	4.3
Working conditions						
Physical demands of the job						
Use of a keyboard > 4 hours	215	96.4	256	89.8	424	96.8
Lifting 25 kg (56 lbs.) by hand	12	5.4	38	13.3	9	2.1
Psychosocial demands of the job						
Time pressure	175	78.1	228	80.0	238	54.3
Lack of support	60	26.8	115	40.4	94	21.5
Incentives	141	63.2	74	26.0	115	26.3
Health-related variables						
Adverse health beliefs LBP						
Poor prognosis	54	24.1	27	9.5	97	22.2
Awareness of RSI, WRULD or CTS[a]	61	27.4	97	34.0	262	59.8
Know someone at work with LBP	137	61.2	197	69.1	348	79.5
Know someone outside work with LBP	137	62.0	172	60.4	363	82.9
Somatizing tendency (number of distressing symptoms)						
0	46	20.7	76	26.8	145	33.1
1	40	18.0	43	15.1	118	26.9
≥2	136	61.3	165	58.1	175	40.0
Mental Health						
Good	156	70.0	183	64.4	331	75.6
Poor	67	30.0	101	35.6	107	24.4

[a]RSI = Repetitive strain injury; WRULD = Work-related upper limb disorder; CTS = cumulative trauma syndrome.

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Table 2

Prevalence of low back pain by country at baseline.

	Prevalence of pain in the last 12 months			Prevalence of pain in past month			Prevalence of disabling pain		
		OR (95%CI)			OR (95%CI)			OR (95%CI)	
	%	Crude	Adjusted[a]	%	Crude	Adjusted[b]	%	Crude	Adjusted[c]
Spain (n=438)	53.4	1	1	33.6	1	1	15.1	1	1
Costa Rica (n=224)	67.9	1.84 (1.31-2.58)	1.71 (1.17-2.48)	46.0	1.69 (1.21-2.34)	1.47 (1.01-2.14)	27.2	2.12 (1.43-3.15)	1.87 (1.17-2.98)
Nicaragua (n=285)	61.1	1.37 (1.01-1.85)	1.19 (0.85-1.67)	44.2	1.57 (1.15-2.13)	1.18 (0.83-1.69)	27.7	2.16 (1.50-3.12)	1.98 (1.27-3.07)

[a]Adjusted for sex, age, know someone at work with LBP, somatizing tendency, mental health, lifting 25 kg (56 lbs.) by hand.

[b]Adjusted for sex, age, other job, know someone at work with LBP, somatizing tendency, mental health, lifting 25 kg (56 lbs.) by hand, lack of support.

[c]Adjusted for sex, age, adverse beliefs about prognosis, know someone at work with LBP, somatizing tendency, mental health, time pressure, lack of support.

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Table 3

Incidence and persistence of low back pain by country.

	Incidence of pain [One-month prevalence at follow-up in participants who did not have low back pain at baseline]			Incidence of disabling pain [One-month prevalence at follow-up in participants who did not have low back pain at baseline]			Persistence of pain [One-month prevalence at follow-up in participants who had low back pain the past month at baseline]		
		OR (95%CI)			OR (95%CI)			OR (95%CI)	
	%	Crude	Adjusted[a]	%	Crude	Adjusted[b]	%	Crude	Adjusted[c]
		(Cases=51 / N=268)			(Cases=26 / N=337)			(Cases=71 / N=125)	
Spain (reference)	19.0	1	1	7.7	1	1	56.8	1	1
		(Cases=18 / N=121)			(Cases=21 / N=154)			(Cases=47 / N=84)	
Costa Rica	14.9	0.74 (0.41-1.34)	0.88 (0.46-1.68)	13.6	1.89 (1.03-3.48)	1.83 (0.94-3.59)	56.0	0.97 (0.55-1.69)	1.24 (0.67-2.31)
		(Cases=51 / N=138)			(Cases=31 / N=180)			(Cases=88/ N=116)	
Nicaragua	37.0	2.49 (1.57-3.95)	2.38 (1.44-3.92)	17.2	2.49 (1.43-4.34)	2.53 (1.38-4.62)	75.9	2.39 (1.37-4.16)	2.51 (1.36-4.66)

[a]Adjusted for sex, age, somatizing tendency, mental health, use of a keyboard > 4 hours, incentives.

[b]Adjusted for sex, age, know someone outside work with LBP, mental health and non-disabling pain at baseline.

[c]Adjusted for sex, age, contract, adverse beliefs about prognosis, and awareness of repetitive strain injury, work–related upper limb disorder or cumulative trauma syndrome (CTS)